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Some Views on Lightning Rods.

In a recent paper before the Institution of Electrical Engineers on "Lightning, Lightning Conductors and Lightning Protectors," Dr. Oliver Lodge made a number of short statements in regard to the construction of lightning rods, which were so fitting and applicable that they may well be read with interest. We quote a few, using the paragraph numbers to be found in the original paper. "51. All parts of a lightning conductor from points to roots should be of one and the same metal to avoid voltaic action. 53. Sharp bends, corners, curves and round-about paths to earth should be avoided as far as possible. 54. The use of copper for lightning conductors is a needless extravagance. 55. Iron has advantages over every other metal. 56. The shape of the cross-section is but little matter. Flat ribbon has a slight advantage over round rod, but not enough to override questions of convenience. 60. If the conductor at any part of its course goes near water or gas mains it is best to connect it to them. 65. It is not wise to erect very tall-pointed rods above the roof of a building. 66. A number of points all along the ridge of a roof is better than only a few. 67. Any part of a building is liable to be struck, and to make quite secure every prominent part of the outside should have a rod running along it. 70. In ordinary houses it may be well to try and insulate the lightning conductor from the walls, so as to lessen the chance of side-flash to metal stoves and things inside. 73. Connecting a lead roof or other such expanse with a lightning conductor is not an unmixed good, for it virtually increases the dangerous proximity of the lightning conductor, and may inadvertently bring it near to many objects which might else have escaped. 78. Over the top of tall chimneys it is well to take a loop or arch of the lightning conductor made of any stout and durable metal. 80. A conductor detached from the building to be protected is safer than one in close contact with it."

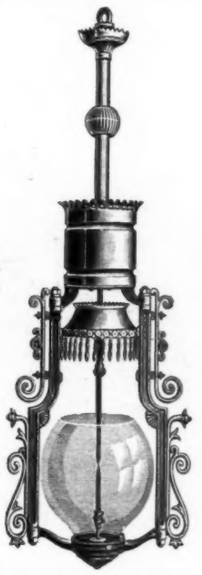
To illustrate how widely the great authorities differ on lightning rod questions, it is only needful to compare the following statements made by Professor Henry A. Rowland at the recent annual meeting of the American Institute of Electrical Engineers, with the above statements, numbered 54, 55, 56 and 70. But increase of surface can best be obtained by multiplying the number of conductors rather than making them flat or hollow. * * * Theory indicates that the current penetrates only one-tenth the distance into iron that it does into copper. As iron has seven times the resistance of copper, we should need 70 times the surface of iron that we should of copper. Hence I prefer copper wire about a quarter of an inch in diameter and nailed directly to the house without insulators.

After reading what both these great authorities have got to say on this most important subject, the reader is left with the choice of following the advice of one or the other, and in either case feeling morally certain that he may be wrong.

* * The Railroad Commissioners (Mass.) Wednesday, granted permission to Lynn and Boston R. R. Co. to make surface or underground alterations in Lynn, so as to adopt an electrical system practically through the city.

An Improvement in Arc Lamps.

The arc lamp shown in the accompanying cuts is the invention of Mr. Geo. M. Lane, of Asbury Park, N. J. The object of the invention is to provide a lamp which will retain its proper arc under a variation of current strength. In order to accomplish this Mr. Lane dispenses with the usual spring or weight for adjusting the lamp, and provides in its stead a magnet, placed directly in the main circuit and so connected that the entire current will flow through it constantly even when the shunts are acting. It is evident that with this arrangement the retaining power of the adjusting magnet will be directly in proportion to the strength of



THE LANE ARC LAMP.

current, and thereby maintain the normal arc even though the current strength may vary to a considerable degree. Another new feature in this lamp is the shunt magnets, which are wound in sections; the object of this is to make the lamp applicable to any system, the range of shunts being from 40 to 60 volts. All the details of the invention are carefully worked out, and the lamp is evidently another step in the right direction of a perfect arc system. Mr. Lane, the inventor, was the organizer of the Asbury Park Electric Light and Power Company, of which he is now the secretary and superintendent.

Another Train Telegraph System.

A dispatch from Raleigh, N. C., says: A test was made, Tuesday, on the Raleigh and Gaston Railroad in the presence of a number of prominent railroad men of a process recently invented by Baylus Cade, of this county, for telegraphing to and from moving trains. The current is maintained by means of a drag which is attached to the car, and which slides over a set of wires laid along the track. Messages were received from the offices at Raleigh and Greensborough while the train was running at the rate of 30 miles an hour.

Prospects Good for Another Cable Line.

Advices received at Ottawa, Ont., from England, state that nearly the entire stock, $2,000,000, has been subscribed in England for the construction of a new Atlantic cable, which is to run from the straits of Belle Isle to a point on the west coast of Ireland. Mr. Dobelle, a wealthy capitalist of Quebec, is the promoter of the enterprise. The Dominion government propose continuing their land line along the north shore of the St. Lawrence to the straits where it will connect with the new cable. The government will hand this line over to the new company, to be held under long lease at a nominal figure. The object is to give to Canada an independent Atlantic cable, and the government is encouraging its construction in every possible way. The government has decided not to accept the offer of an English company to lay a cable from the main land in Nova Scotia to Sable Island, for which they had at first agreed to pay an annual subsidy of $10,000 for 12 years.

INTERIOR VIEW OF THE LANE ARC LAMP.

Electrical Reasons.

The Anaconda, Mont., *Review* wants Montana's capital to be Anaconda. It says:

What is the matter with Anaconda for the capital of the territory? It is the coming city of Montana, and in permanent improvements is even now in the lead. We have the best system of water works and the purest water in Montana. Our electric lights, both arc and incandescent, double discount those of Butte and Helena. The finest hotel between St. Paul and the Pacific coast will be opened here next month, and the location of the city is the finest in the territory without dispute. We have competing telegraph lines, and all the railroads in Montana will be here in a year's time. Every facility to make the location central is here, and if the west side of the range, where the capital really belongs, will unite on the proposition, the location of the capital can be secured for Anaconda.

"On the Security against Disturbance of Ships' Compasses by Electric Lighting Appliances."

BY SIR WILLIAM THOMSON, READ BEFORE THE INSTITUTION OF ELECTRICAL ENGINEERS.

The danger to be avoided is sufficiently explained in the following short statement by Mr. William Bottomley, which appeared in the *Nautical Magazine* for December, 1885:

"The following example of a case, which might occur in any large ship, will show the amount of error which may be produced on the compass" [by the electric lighting apparatus] "unless precautions are taken to guard against it.

"Suppose a main lead from the engine room to the fore part of the ship, to light up 100 lamps, is brought along the center of the ship. It may be at a distance of 10 metres, or 33 feet from the standard compass, and will run almost underneath it. If we suppose that each lamp takes one ampere of current there will be a current of 100 amperes altogether in this lead. Now, the effect [of an infinitely long straight current] on the compass [above it] at a distance D in centimetres is given by the formula

$$F=\frac{2\times\frac{1}{10}}{H}\frac{C}{D},$$

where C is the current in amperes and H is the horizontal magnetic force. In this case we have C=100 amperes and D=1,000 centimetres. Therefore,

$$F=\frac{20}{1{,}000\,H}=\frac{0.02}{H}.$$

At Glasgow the horizontal force may be taken as 0.15 in C.-G.-S. units, therefore the effect on the compass will be $\frac{.02}{.15}=\frac{1}{7.5}$. This will be expressed in degrees by multiplying by 57.3, the number of degrees in the radian, or angle subtended at the centre of a circle by an arc equal in length to the radius. Therefore the amount of error produced by such a current on the compass will be

$$\frac{57.3}{7.5}=7.6 \text{ degrees.}$$

"The foregoing refers to a single wire and a continuous current machine, but if an alternate current machine is employed no effect will be produced on the compass even when the ship's side is used for the return. When a continuous current machine is used, the danger of producing an error on the compass can be avoided by using two wires close to one another, but these wires should be well insulated from the ship's side. If in any way [two points of] one of the wires is brought in contact with the iron of the ship there may be no change observable in the lighting, but the current may produce as much error on the compass as it would if there was only a single wire.

"The following points should therefore be attended to in all cases of lighting ships by electricity:

"First—With continuous current machines two wires, well insulated, should always be employed.

"Second—The insulation of the wires

should be tested periodically; if any connection with the iron of the ship is found the fault should at once be made right.

"Third—When an alternate current machine is used, a single wire may be employed and the iron of the ship used to complete the current without producing any effect on the compass.

"What makes this question of the greatest importance is that the error may be produced without ever being detected by the officers of the ship. On board ship the errors of the compass are usually determined during the day, in the morning and afternoon, but the electric light is only used at night. The captain may therefore carefully determine his errors every day, and set his course quite correctly; but at night, when the electric light is turned on, the ship may be going several degrees off her proper course, although she is being correctly steered by the compass.

"In connection with the lighting of ships with electricity there is another point which should also be attended to—that is, the position of the dynamo. If it is placed near an iron bulkhead, the upper end of which is near the compass, the bulkhead may become magnetized by induction so powerfully that it will produce a considerable error on the compass."

The subject was also referred to in Mr. Bottomley's paper on "The Magnetism of Ships and the Mariner's Compass," read before the Society of Arts, January 28th, 1886, and published in the *Journal* of the Society for February 5th, 1886. In the discussion which followed, and in which Captain Creak, of the Admiralty Compass Department, Mr. Alexander Siemens and Dr. Hopkinson took part, it appeared that in three ships, lighted on the single wire system with direct currents, small but not unimportant errors in the compass, due to the lighting currents, had been actually observed. Since that time several cases have been reported to me of large passenger ships, lighted with direct currents on the one wire system, in which as much as four degrees or five degrees of error on the compass has been produced by the electric lighting.

In the latest of these cases, a few weeks weeks ago, an error of four degrees on the north course was found when the light was put on. The light was put on and off several times with the ship's head north, and every time the same error was produced.

The precautions for security which I have to suggest are:

1. The use of the two-wire method exclusively (unless, which is now rarely the case, alternate currents are used).

2. A differential galvanometer on the two mains for the lighting current to show approximate enough equality of the outgoing and in-coming current. A rough and cheap instrument (on the old telegraph "detector" plan) would, I believe, suffice, and would be valuable for the electric lighting system (independently of the compass question) to give timely warning of any faults or accidental contacts or failures of insulation sufficient to cause any considerable difference in the strength of the currents carried by the two mains.

3. Care that there is not magnetic "leakage" from the dynamo (as practical men, guided by Faraday's ideas, theory, and language, have now taught the scientific world to call it) enough to produce any compass-disturbance of practical moment. Captain Creak, speaking at the end of 1885, in the Society of Arts discussion previously referred to, said that in one ship the direct compass-disturbance produced by the generating machine was "felt through a distance of 55 feet," and across iron bulkheads, and that it was perceptible also in other ships of the Royal navy electrically lighted on the two-wire system.

My impression is that the improved dynamos now made have much less of magnetic leakage than those made prior to 1886, but we still want information as to their disturbing magnetic effect at such distances as have to be considered in connection with the compass question.

4. To ascertain that there is no perceptible compass-disturbance, or if there is any to test its amount, the compass should be observed while the current through the dynamo is started and stopped, either by starting and stopping the dynamo itself or by making and breaking the circuit of the field magnets. This should always be done before the electric light installation is taken over from the contractors. It is best and most easily done when the ship is in dock, or lying steadily at anchor. On no account ought it to be delayed, in a new ship, till she goes out for compass adjustment. A determination of the amounts of the disturbance, if any, for all courses of the ship can be made by aid of my deflector without moving the ship. But a sufficient practical test may be made by first observing the effect of starting and stopping the current on the compass as it stands; then adjusting a small magnet placed on, or supported a little above the glass of the bowl, to deflect the compass about 45 deg. first on one side and then on the other side of its undisturbed position, and in each case observing the effect of starting and stopping the electric current. This effect ought not to be as much as two deg. in any of the three cases.

5. A small electric lamp may safely (and with very great advantage in most cases of electrically lighted ships) be used to light the compass. The effect, if any perceptible, of its current on the compass ought to be tested in the manner described in No. 4.

DISCUSSION (Authorized Abstract).

In opening the discussion, Captain Creak said he was glad Sir William recommended the two-wire system, for that in itself was a great safeguard against disturbance. So far as his own experience goes, most trouble arises from magnetic leakage due to the employment of machines having considerable external field and placing them in positions with respect to the iron of the ship that such field was directed towards the compass. In one case, H.M.S. "Northampton," where three such machines were used, an error of 11 degrees was produced when all the machines were running, and three correction tables were necessary.

Mr. Alex. Siemens, as an advocate of the single wire system, thought it quite unnecessary to use two wires, for in all his experience, extending over many ships fitted on the single-wire system, only one instance had occurred in which complaint was made, and in this case the wiring was done before the position of the compass had been decided upon, the spot eventually chosen being in close proximity to the leads. As a proof that the single-wire system could be made satisfactory, he mentioned that his firm make inquiries on all vessels fitted by them every time they come into port, in order to ascertain whether any inconvenience arises from the electric lighting apparatus; but with the exception above quoted no complaint has been made.

Referring to Mr. Bottomley's letter mentioned in the paper, Mr. Siemens said the screening effect of the decks had been entirely neglected in the calculations there given.

A second case of disturbance had come under his notice by his being asked to inspect a ship fitted by another firm, and the maximum deflections produced were one-half degree and one and one-half degree on the standard and steering compasses respectively.

As regards the position of dynamos he had found no appreciable effect at distances greater than 50 feet.

Prof. G. Forbes, speaking of H.M.S. "Northampton," said that the dynamos referred to by Captain Creak were placed in an iron room, and still the disturbance produced was very serious. From an examination of machines of the type there employed he found that the leakage mainly comes from the parts of the yokes near their junction with the cores, but he had reason to believe that in the more modern machines the leakage has been considerably reduced.

Prof. Jamieson mentioned the case of S.S. "Bombay," in which the steering compass was disturbed nine degrees; the fault was traced to a wire about four feet from the compass, and remedied by running a return wire.

Mr. Raworth, in corroborating Mr. Siemens with regard to the great convenience of the single-wire system, gave additional details respecting the second case mentioned by Mr. Siemens. The compass was influenced by either of two converging wires running along lower passages, according as the needle was parallel to one or to the other. On examining the decks the iron was found cut away between the wires and the needle, and the defect was remedied by enclosing the former in three-inch iron pipes.

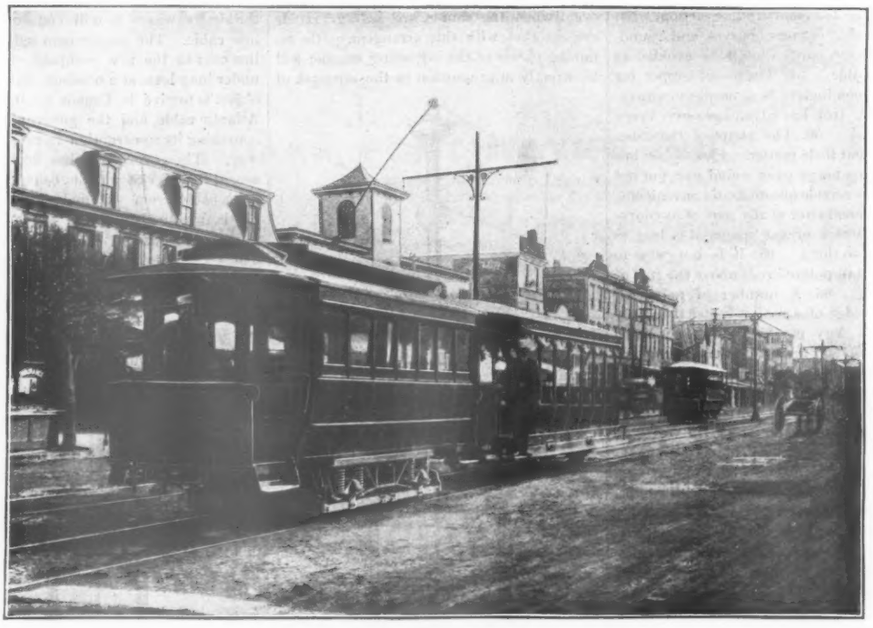
Major Cardew described his experience in lighting binnacles electrically, as suggested by Sir W. Thomson in his note, and although he carefully twisted the leading wires together the filament seriously affected the compass reading.

Sir W. Thomson, in reply, said that caution was necessary in arranging lamps for lighting compasses, and in answer to Prof. Forbes expressed an opinion that alternate currents if used in such lamps would not demagnetize the needles. Referring to the screening effect of decks, he pointed out that Captain Creak's observations proved them to be of little use in neutralizing the external field of dynamos, and to be efficient the iron required to be very thick. The decks may, however, considerably reduce the action of currents on the compasses, especially where the circuits are completed between two decks; but when the wires pass from one deck to another the screening effect is much reduced. Although the conductors in the single-wire system may be placed so as not to affect either one of the two compasses generally used, yet it is very difficult to arrange that neither are disturbed, as any disagreement between the two (especially as the difference may vary with the portion of the ship being lighted) further complicates the navigation, Sir William felt sure it would be far the best plan to adopt the two-wire system in all cases.—*The Electrician, London.*

A View on the Atlantic City Electric Railway.

The accompanying engraving gives a view of one of the Sprague electric cars in operation at Atlantic City, N. J., drawing an ordinary car.

This line has been in operation for about six weeks, and during this time the cars have made 6,464 trips, without the loss of a single trip, although there have been no reserve cars to supplement those in use.



THE ATLANTIC CITY ELECTRIC RAILWAY.

The original order of the Pennsylvania Co., which controls the system of street railways at Atlantic City was for six cars, each to be equipped with two 15 horse-power Sprague motors, and each to be capable of drawing an ordinary street car. Since the demonstration of its successful operation at Atlantic City this order has been increased to 16 electric cars, each capable of drawing an additional car.

One noticeable characteristic of this road is the extremely light and ornamental character of the overhead system.

The poles are of iron throughout the entire length of the line, and are placed between two tracks, using the double bracket method of support for the trolley-wire.

* * Mr. F. A. Laughton, of Bangor, has appeared before the Board of Railway Commissioners, in Augusta, Me., and applied for a charter to build an electric road at Bar Harbor. He proposes to at once construct a road three miles, from the village to the foot of Green Mountain, to connect with the mountain railroad, having it equipped and in operation this season. Later on he would extend the line in other directions. The railroad commissioners, Tuesday, renewed the charter of the Mount Desert Railway for three years.

Repairing Incandescent Lamps.

The REVIEW presents to its readers today a representation of a new form of glow lamp, the manufacture of the Phœnix Incandescent Lamp Company, of Chicago.

A novelty in the construction of the Phœnix lamp will be found in the fact that the terminal wires are left free in order that these may be fixed in any socket, of whatever make. This permits of their use on any plant, whether constructed for Edison, Sawyer-Man, United States or one of the many other systems in vogue throughout the country.

The user of electricity will readily understand and appreciate this new phase of lamp manufacture and the advantages it offers in the way of economy and choice of system. The purchaser is now enabled to buy where he chooses and he is unrestrained; he is given the benefit of a wholesome competition, which in every business gives the consumer the highest satisfaction.

Another material benefit enures to the consumer in the fact that there is a positive value to the burned out, or broken lamp. Heretofore these have been considered worthless, and have in consequence been thrown away. The new plan of the Phœnix Company places a value on these remnants, and makes it worth one's while to save the sockets of all such lamps, which the company will fit to new lamps for its patrons. The cost of plant maintenance is thus much reduced by utilizing what was formerly thrown away as valueless.

All sizes of incandescent lamps are made by the Phœnix Company to suit purchasers, and any style, shape, resistance, or candle-power, to suit the needs of patrons, may be obtained.

Transmitting 10,000 Volt Currents.

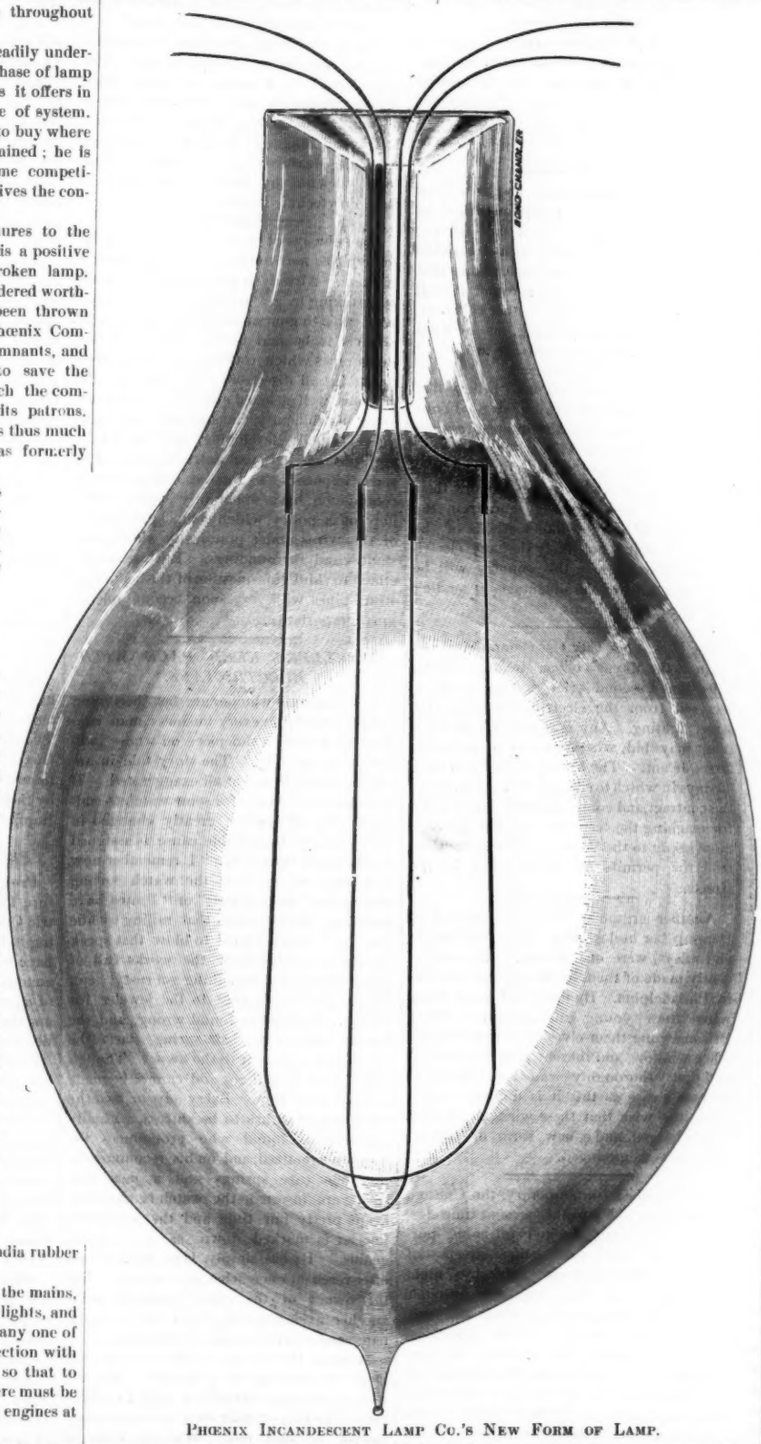
The evidence given by Mr. S. De Ferranti, the chief electrician and engineer to the London Electric Supply Corporation, at the board of trade inquiry on the subject of electric lighting in London, is interesting regarding the transmission of high tension currents.

Mr. Ferranti stated last year that they were now erecting at their central station two 10,000 horse-power dynamos, which will give, with the dynamos now ready, a capacity of 250,000 lamps of 10 candle-power, in addition to 33,000 lamps at present supplied by their smaller station in London. He further stated that the company had contracted for the erection of further plant, bringing up the total capacity of the works to 450,000 lamps. The company proposes laying down six mains of the concentric conductors already described in these pages, which are to be carried on cast iron brackets along the railway, and provided with porcelain or india rubber supports for the cables.

A large margin is provided in the mains, each having a capacity of 100,000 lights, and the mains are so arranged that any one of them may be thrown into connection with any other at the central station, so that to have a total failure of lighting there must be a break down of both mains and engines at the same time.

The loss of potential in the mains is calculated to be one-fifth of one per cent. per mile run. With regard to insulation between the inner and outer conductors, Mr. Ferranti has tested the insulating capacity in a number of lengths up to 1,000,000 volts without injuring the insulation in any way. Therefore, with the pressure at which it is proposed to work, viz: 10,000 volts, there would be a safety margin of 100 to 1. The amount of coal required for 100,000 lights of 10 candle power, from the experience gained at the London station now in operation, was 100 tons a day of 10 hours with non-condensing engines, but with the engines now erecting at the central station it would be much less. Mr. Ferranti has no fear of any accidents occurring from a leak in the converters by which a tension of 10,000 volts, or even 2,400 volts would be brought into the houses, as that is provided against by the use of automatic cut-out apparatus, which would burn out the fuse connecting with the house. The opinion of this expert is distinctly in favor of underground wires. The majority of their mains now in use are overhead, and there has been trouble with the insulation, while at Nancy in France where his system is in operation with underground wires, there has occurred only a single case of defective insulation. Apparently we have something to learn in this respect from Mr. Ferranti. It is proposed to connect to earth at the central station, and to insulate along the line in order not to interfere with telegraph and telephone work. The length of the mains from the central station at Deptford to Westminister, where one of the distributing stations will be, is about seven miles. The test made of the insulation, with a pressure of 1,000,000 volts was made with a Wimshurst machine, giving a 12-inch spark. Mr. Ferranti declined to commit himself as to the value of the alternating current for motor purposes, but said he believed that a suitable motor would soon be available, and that the business of his company was to supply electricity and allow the customer to do what he liked with it. The cost of the mains for seven miles, including excavations where necessary, would be seven per cent of the cost of the plant.

Sir William Thomson, in his evidence, said that he considered there was great but not insuperable difficulty in working at 10,000 volts pressure and he believed it could be practically carried out. It is stated that he looks upon a high potential as no more dangerous than a circular saw.—*Engineering and Mining Journal.*



PHŒNIX INCANDESCENT LAMP CO.'S NEW FORM OF LAMP.

* * The stockholders of the Glens Falls, Sandy Hill and Fort Edward street railway have chosen the following officers: Directors, J. M. Coolidge, H. R. Leavens, J. W. Bush, W. H. Robbins, B. B. Fowler, Orville Smith and A. V. Brayton. The directors then elected: President, J. M. Coolidge; vice-president, J. W. Bush; secretary and treasurer, B. B. Fowler.

Goldsboro, N. C.—The Goldsboro Light and Power Company; incorporators, O. H. Foster, C. A. Barlow, and B. S. Jerman.

Salem, Ore.—The Alaska Electric Power and Light Company; capital stock, $300,000; Charles E. Benn, F. O. Downing, and Alex. Thomas, incorporators.

Tonawanda, N. Y.—The Tonawanda Electric Light and Power Company; incorporators, J. N. Hickey, A. G. Kent, and A. C. Campbell; capital stock, $1,000.

Chicago, Ill.—Fulton and East Clinton Street Car Railway Company, Fulton; capital, $50,000; incorporators, John C. Martindale, Thomas A. Hardin, Charles A. Griswold.

Chicago, Ill.—Champion Burner Company, Chicago; to manufacture liquid fuel and burning devices; capital, $200,000; incorporators, Charles E. Davis, Charles S. Burton, Francis W. Parker.

Chicago, Ill.—Economy Fluid Controlling Company, at Chicago; capital stock, $150,000; to manufacture machinery for controlling steam; incorporators, Henry Glick, E. J. Colby, Lohman Glick.

Chicago, Ill.—Cook County Conduit Company, Chicago; to construct conduits for all kinds of wires, cables or small pipes; capital, $25,000; incorporators, David Sullivan, J. B. Hefferman and Edward B. Healy.

New York.—The Rheinhardt Manufacturing Company is for the purpose of making a "rapid money changer" and electrical and labor-saving machines. Its trustees are James H. Rheinhardt, Henry L. Tarbox and P. Van Alstyne.

Chicago, Ill.—Edison Fuel Oil Burner and Construction Company, at Chicago; for the construction and operation of plants for steam boilers and furnaces; capital stock, $100,000; incorporators, Robert D. Davidson, Stephen A. Douglas, Herlan H. Pech.

Frankfort, N. Y.—The Frankfort Electric Light Company, to manufacture and use electricity is incorporated. The capital is $6,000. Operations are to be carried on in Frankfort, Herkimer county. Frederick C. Eaton, of Utica, James L. Sizer and George H. Watson are trustees.

Pittsburgh, Pa.—A charter was granted to the East Pittsburgh Glass Company; capital, $6,000. The business is to be transacted in Patton township. The shareholders are: George Westinghouse, Jr., H. M. Sylby, A. L. Reinman, A. F. Pow and W. L. McCullogh, all of Pittsburgh.

St. Louis, Mo.—The Municipal Electric Lighting Company, capital, $750,000, filed articles of association in the office of the recorder of deeds. The stockholders are: Chas. Sutter, 74,400 shares, and Julius S. Walsh, W. L. Hill, Ben. Von Phul, John M. Sellers, Brainard Rovison and M. F. Taylor, each of whom owns 100 shares. The object of the company is to supply electric light to public buildings and private dwellings.

Lansing, Mich.—The Michigan Electric Storage Company, at Lansing. The officers are Brainerd Cortrite, president; William Aikman, vice-president; S. B. Coleman, treasurer; C. F. Burton, secretary. The board of directors is composed of the foregoing officers, and Thomas Harris, Alfred Woodward, and Orren Wardell, of Detroit. Capital stock is $1,5000,000, divided into 60,000 shares of $25 each. The company will operate the patents of Cameron and Harris storage battery, which will be used for street car propulsion.

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We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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CONTENTS.

	PAGE.
Some Views on Lightning Rods	1
An Improvement in Arc Lamps	1
Another Train Telegraph System	1
Prospects Good for Another Cable Line	1
Electrical Reasons	1
"On the Security against Disturbance of Ships' Compasses by Electric Lighting Apparatus."	1
A View on the Atlantic City Electric Railway	2
Repairing Incandescent Lamps	3
Transmitting 10,000 Volt Currents	3
New Corporations	3
Jewelers Keep Pace with Electricians	4
High Tension Currents	4
Professor Spice's Lecture	4
Latest Electrical News:	
Our Chicago Letter	5
Our Boston Letter	5
Our Toronto Letter	5
From Flood-Stricken Williamsport	5
A Magnetized Watch Loses Its Owner Champagne for the Party	5
Telephonic News	6
A Telephone Story	6
The Alexandra Palace Telephone Line	6
Pilfering Telegrams	6
The Bentley-Knight System in Boston	6
A New Fire Alarm System	7
Subway Matters in Omaha	7
The Canadian-Pacific vs. Western Union Company's Suit	7
Telegraphic	7
Electric Power	8
The Bentley-Knight System in Boston	8
The Observatory Hill Passenger Railway	9
The Carbons Twisted and Broke	9
Electric Light News	9
Brooklyn Street Railway, Cleveland, Ohio	10
An Electric Marine Indicator	10
Electrical Patents	10

The advocates of electric lighting in this country have long been poking fun at the electrical fraternity in England for the excessive deliberation which has there characterized the advancement of commercial lighting. But England is a conservative country, and Englishmen individually are fitting components thereof. When they do go into business they generally do it on safe and well-weighed grounds. Just now electric lighting in England is receiving an impetus which bids fair soon to catch up to our great progress. The London Electric Supply Corporation is now erecting what will be in magnificence of proportions the grandest lighting plant in the world. The system will be that of Ferranti. The total capacity will be 450,000, or nearly a half a million lights! The station is now supplying current to 33,000 lamps, and the above gigantic additions are now being made. Some interesting particulars are given of this monster plant on another page of this issue, and we commend a careful perusal.

The article by Sir William Thomson, reference to which was made in these columns in our last issue, was unavoidably crowded out owing to the pressure for space, and appears in the present issue. It will bear a careful reading.

It is stated that the proceeds of the sale of 1,000,000 feet of the West End Land Company's land, which is expected to realize $1,000,000, will go to equip the West End railway of Boston, with electric power. The land company now owns 3,800,000 feet.

The worth of the wonderful electric tabulating system, the invention of Mr. Herman Hollerith, of Washington, fully illustrated and described in the REVIEW January 26, 1889, has been recognized, and they will perform a large part of the work of the census of 1890.

Our valued contemporary the *New York Daily World* bitterly complains that its private telephone for which it pays $45 per month is constantly crossed with other electric service wires, and expresses a hope that when all the wires are underground it will work more satisfactorily. Rather cold comfort that. Much like hoping one will not get out of the frying pan into the fire.

Present indications lead us to believe that the coming industrial exhibit at St. Louis, this fall, will be of peculiar interest from an electrical standpoint. Every possible facility will be offered to manufacturers of electrical apparatus and supplies to show their goods to the best advantage, and from the energetic and business-like methods of the management it is not likely that any electrical manufacturers in this country will be left in ignorance of the advantages of sending their goods to St. Louis.

The New York City Gas Commission met again at the Mayor's office, Monday, and decided that a second series of bids would be received from the electric companies for street lighting. Any company which has a plant may bid, whether it has wires in the street or not. The lowest bidder will have 30 days in which to comply with the terms of the contract, and companies without facilities for reaching the territory in their districts must apply to the Board of Electrical Control for permits to string wires in the streets.

Another argument for the removal of "tramp" or useless wires from our streets and alleys, were one needed, is the use recently made of them by two young burglars in Philadelphia. By means of some loose wires these young candidates for State's Prison swung themselves from a roof to an office window, and thereby gained access to, and pretty thoroughly cleaned out, the office. In such a case as this it is difficult to suppress the wish that these wires might have been charged, and a new form of burglar trap thus extemporized.

Our esteemed contemporary, the Chicago *Herald*, says: Up to the present time electricity has been devoted to noble purposes. It has made the streets of cities as light and as safe by night as by day. It has rendered hospitals cheerful and has given us a motor that produces no noise, smoke or dust. Electrical executions would cast ignomy on electrical science. Substituting the dynamo for the gallows and the electrician for the hangman is an outrage on applied science. These suggestions are certainly worthy of the consideration of legislators who are thinking of changing the mode of inflicting the death penalty.

One of the most necessary subjects which should be discussed at the summer meeting of the National Electric Light Association is the question as to what shall be the legal insulation resistance of electric light circuits. There is no question on which practical electricians differ more at the present day; and there is no factor which differs more widely in actual practice. Prevalent opinion would seem to place the resistance higher than good judgment would warrant, and ordinary practice usually makes it by far too low. A universal ratio between E. M. F. and insulation resistance per unit length of conductor in use should be arrived at and honestly lived up to.

The thirty-eighth meeting of the American Association for the Advancement of Science will be held at Toronto, Ontario, beginning Tuesday, August 27, next, and continue for a week or ten days, the last few days being devoted to excursions. Arrangements for reduced railroad tariffs and special rates at hotels are being made, and information will be supplied by the permanent secretary, Mr. F. W. Putnam, of Salem, Mass. Among the papers and discussions will be one on the "Relative Merits of Dynamometric and Magnetic Methods of Attaining Absolute Measurements of Electric Currents," opened by Prof. Thomas Gray of Rose Polytechnic Institute.

The subways of New York may yet become a *bête noir* to those who have charge of them. Already it is becoming a difficult undertaking to get manufacturers of insulated cable to guarantee the insulation if the cable is to be laid in the vicinity of the steam pipes which traverse the down-town streets in all directions. As long as the pipes are well jacketed and tight there seems to be no difficulty encountered, but leaks are continually developing, and the results are insiduous and most untrustworthy. The end is impossible to foresee. The subway commission have apparently settled definitely on a policy which compels the burial of the wires under practically all circumstances and surroundings. But we are inclined to think this question of the heat from steam pipes will very soon become one of grave importance.

JEWELLERS KEEP PACE WITH ELECTRICIANS.

Non-magnetic watches are fast becoming a real necessity to every business man who needs to possess a timepiece on whose indications he can rely. The story told in another column is not at all exaggerated. It is a daily occurrence for some watch to suddenly stop or become greatly changed in rate. Every imaginable cause is assigned for the queer behavior. "I remember now in putting on my vest the watch swung over against the bed-post," or "I must have leaned too heavily upon that railing awhile ago," or "when I tried to blow that speck off the crystal I blew the works full of damp breath and something got rusty," etc. Finally the watch goes to the jeweler for repairs. Nothing is found wrong, and the jeweler adjusts the hair spring, starts the watch and restores it to the owner. Though it now runs it will not and cannot be made to keep good time. Every day or two the adjusting lever has to be shifted. Finally a jeweler is found who pronounces the watch magnetized, and on his recommendation new case springs and a new hair spring are inserted, the watch is adjusted, keeps pretty fair time and the successful jeweler is marked down as a "regular genius." He has simply kept posted, and discovered at once what was wrong. But the owner of the watch, perhaps, inside another week happens to get close to a dynamo and away goes the watch again.

What is the remedy? The dynamo has come to stay and is a fixture. Electric motors are being introduced with a rapidity fairly like that of their own speed, and they cannot be shut out. Watches must be carried. But watches have for ages been the fruitful subject of man's ingenuity, and this same inventive fever is as strong in the watchmaker as in the electrical engineer, and the remedy is already found and the time-honored test of practical use has left it invincible. The hair spring and balance have been divorced from steel and are now wrought from a material that can scoff at the wiles of the omnipresent magnet, and a really non-magnetic watch is the result. The gentleman who lost the bet has doubtless found this out and by this time has a timepiece which will enable him hereafter to bet on a sure thing.

HIGH TENSION CURRENTS.

In the present turmoil in this country, on the question of safety as between the continuous and alternating currents, perhaps the most striking aspect of this Electrical Saurian is the calmness with which enormous pressures are discussed by its English projectors. Some of our arc lighting circuits are nightly run at a pressure of 3,500 volts, the generators being of the direct current type. Our alternating current systems are, we believe, mostly operated at a pressure of 1,000 volts, though some of them double that figure. But here comes the slow and conservative English capitalist and puts his money into a stupendous plant which is to make a total eclipse of our largest stations, and this is to be all done at the tremendous pressure of 10,000 volts! And this is not the scheme of some visionary feather weight, nor the attempt of any electrical Icarus to reach the sun of notoriety, but it is the deliberate decision of some of England's foremost and most practical electrical engineers. They have not been distracted by the discussions of the Harold P. Brown doctrines that the alternating current is only fit to finish up a dog-pound and the continuous current is just the thing to place in the hands of mothers as a lullaby for the infants; but they have gone to work on scientific and business principles and determined their data most carefully. A no less eminent authority than Sir William Thomson goes on the stand and testifies his belief that practical operations can be carried out successfully at 10,000 volts pressure. Shades of Mayor Grant and ex-Mayor Hewitt! What is this electrical imp of light going to do? Why, business of course. Sir William looks upon a high potential as "no more dangerous than a circular saw." Yet our worthy mayor's fiat has not gone forth against the thousands of these buzzing instruments of torture and cruel death which daily whirl their myriad revolutions in this city. It seems to us about time to call a halt in this fanatical condemnation of high tension currents right here in New York. The eyes of the scientific world are upon us. Our electrical engineers certainly cannot lend themselves to be made a laughing stock of by their brethren abroad. The days of the Inquisition are gone by.

PROFESSOR SPICE'S LECTURE.

Professor Robert Spice delivered his lecture Thursday, June 20th, before the Electric Club to a large and appreciative gathering. The members of the Electric Club have learned that when Professor Spice is announced as the lecturer they may be sure of an entertaining and instructive discourse, and the experience Thursday evening proved no exception to the rule. The subject was "Exact Ways of Determining Pitch," and an advantage of hearing Professor Spice on this subject is that he is one of the highest, if not the highest, authority in the matter, and his statements gain an interest and force in being first hand and not quoted. The determination of pitch for Paris, Covent Garden, London, and the Steinways, of New York, has fallen to the lot of the Professor, and, as he says, Paris, London and New York may be taken as the whole world.

Prof. Spice afterward spoke of the acoustic principles involved and illustrated by experiments, the rarefaction and condensation effects, and the interference of sound. The experiment showing the line of neutralization where the alternate phases of wave motion meet and counteract each other, was carefully and successfully performed, and in common with the other delicate experiments, called forth hearty applause. The "beat" effects caused by the alternate combined and interfering action of sound waves from two bodies vibrating at slightly different rates, were nicely shown and the method explained, wherein this beating property is made use of in raising or lowering the rate of vibration of a tuning fork, or other vibrating body. In closing, Prof. Spice instanced one or two cases in which changes of pitch were made by him by these, in a way entirely mechanical means, and the results pronounced correct by the best musical authority. At the close of his remarks, the thanks of the Club were most cordially given to the lecturer.

LATEST ELECTRICAL NEWS FROM ALL POINTS.

OUR CHICAGO LETTER.

Eternal vigilance is the price of safety in electric lighting as surely as it is the price of liberty in a nation. We had a case in point here the other day. It was a combination of curious freaks that produced the result. Firstly, an arc light company came along and ran its wires along the curb wall under the sidewalk, all right and proper in front of an untenanted building. Next came along a lot of chaps with a corner on a bath system, in which hot air is substituted for hot water for parboiling patrons, and wanting all the room possible, they plastered in the arc light wires as solid as the Egyptians used to tie up their deceased relatives. The next number on the programme was the nailing of incandescent wire moulding directly over and into the arc light cables. Then the hot steamy air of the new fangled Turco-Russian hot-air-burn-you-till-you-sweat system worked its way into the woodwork, and made things damp enough so that a blaze was inaugurated by the escaping current. There were three "ifs," at least, that would have prevented the little burn, which, fortunately cost little, but might, under other circumstances, have been much more expensive.

If the company had been notified of the intended covering of its wires by the plasterers, who knew no better, or

If the plasterers had not covered them, or

If the knights of the bath had not wanted to use incandescent lights, or

If the incandescent man had not driven a nail at that exact spot, or

If the air in the room had remained dry, there would have been no fire. And that is why I spoke about eternal vigilance as I did.

Valuable Franchise.—Lake View lies just north of Chicago, and will be a portion of the city in a comparativeiy short time. It is at present a city on its own hook, and has a municipal organization which covers the the township. Its people are mostly in Chicago during business hours, but go out there to dine, smoke and sleep and swap lies about profit and loss accounts.

The other day a lot of these Colossus-of-Rhodes inhabitants got together and organized an incorporation called the Western Light and Power Company, with a capital of $100,000, to furnish light and power. The president and treasurer of the company is Wm. M. Talcott, formerly agent for the Hawkeye Motor Company, who also does service on the special wires for one of the morning daily papers here.

The Council of Lake View has granted the company a five to seven years' franchise to erect and maintain a pole line or lines within the township of Lake View, for public lamps of half and full arc luminosity, at rates of $140 to $160 per annum. The company is permitted to rent lamps to citizens at 40 to 50 cents per night for arc, and one cent per lamp hour for glow lamps.

As Lake View includes Ravenswood, Argyle and half a dozen other country places with metropolitan aspirations, the franchise is thought to be very valuable. The grant contains a clause intended to guard against having the wires forced underground suddenly in case of annexation. The plant will start off with 103 public lamps as soon as these can be put in position, and work is to commence at once.

Ring Wrestling.—Blue Island, Ill., advertised a while since for a plant which included one 35-light dynamo, 25 double lamps, five miles of circuit with 40 to 45 feet poles, strung with Candee or Simplex wire, 25 mast arms, engine, etc. Bids being opened, there were found by the 11 representatives assembled to be several competitors, and a range of prices which scattered five like an auction shot-gun. These are the bids as published: T. H. Co., $6,000; Excelsior, $5,945; Waterhouse, $5,600; Sperry, $5,400; Indianapolis Jenney, $5,220; Brush, $5,125; Fort Wayne Jenney (American), $4,775, and Western Electric, $4,000. Argumentative disputation was carried on in three separate languages, and scriptural quotations in colloquial latin were frequent.

The Chicago Auditorium Building, which covers an acre and a half of ground, and which is being wired by Leonard & Izard, is nearly completed in some of its parts. In the hotel portion the New Haven Clock Company will place one of the "Hartford combined clock, automatic guest call and annunciators." When the guest leaves word to be called at a certain hour the clerk plugs a hole beneath the number of the room where the vibrating bell is on duty near the guest's bedside. The particular hole plugged is that which indicates the time mentioned. The clock goes pegging along till the hour arrives, when the proper contact is made by the plug and the time wheel, and for two solid minutes that rattletrap keeps up its clatter unless the guest wakens sufficiently to get up and push a button to notify the clerk he has enough.

Then too there is the "Porter Electric Messenger," put in by the same company. It is a sort of American district call box, with 30 different calls, supplying the guest with nearly everything he is likely to wish for, unless he is from some uncivilized portion of the earth. A dial in the office corresponds with the smaller boxes, and upon this are two hands one of which gives the number of the room—the other the beverage—milk—water, etc., placed radially from the center to the circumference of the disc.

All the clocks in the house will be run by electricity from the Western Union regulator, and the moralist will be reminded of the flight of time in every hall, parlor and public room of the hotel. This department will be the only department of the establishment which will go on tick, though everything about the establishment will be done on time. 4,600 incandescent lamps will light the hotel portion of the building alone, while the theatrical and business portion will require some thousands more.

F. W. Horne, western agent of the Excelsior Company, has just sold a lot of 60 double arc Excelsior lamps to the consolidated Light and Power Company, of Kansas City, Kansas.

The Electrical Supply Company at Chicago has just brought out an insulating joint for gas fixtures, which permits of any required angle, being maintained without injury. The joint is of the ball and socket form, and can be applied and fixed without the aid of pipe tongs. C. C. H.

Chicago, Ill., June 24, 1889.

OUR BOSTON LETTER.

The Overhead System on Boylston Street.—Poles are now being set for the overhead wires of the West End street railway on Boylston street, from the Back Bay Park entrance of Beacon street to Park square. Some formidable opposition has been raised to a wholesale trimming of the trees along by the Public Garden and quite properly too, for Bostonians are justly proud of these lords of the forest on city streets, and it is hoped some sort of a compromise may be arranged even if it calls for additional poles. The Charles Street Line is also now equipped with poles for the overhead wires.

The Robinson-Foster System in Newburyport.—The electric power plant of the Robinson-Foster Company has been started in Newburyport, in spite of legal objections over technicalities of the company's charter, and several factories are obtaining satisfactory power from it.

Electric Lights Delight Whitman.—The electric plant at Whitman, near Brockton, was started for the first time Monday evening, and the occasion was a gala one for the town, everyone turning out to inspect and pronounce judgment on the new illuminants It is needless to say the judgments were entirely favorable. Mr. W. A. Harris, formerly with the Thomson-Houston Company, is the superintendent, and the capacity of the plant is 50 arc lights and 500 incandescents.

An Important Appointment.—It is reported that Mr. S. F. Pearson has been appointed engineer to superintend the entire reconstruction work of the West End Company as far as it concerns the power plants for the electric systems. Mr. Pearson is a young man, having been graduated from Tuft's College in 1883, and has already established a reputation as a hard and earnest worker, possessing much executive ability. The appointment was unsolicited, and is said to have been as much a surprise to him as to his friends.

The Thomson Electric Club.—Dainty cards of invitation from the Thomson Electric Club called together a large audience at Association Hall, Lynn, on Tuesday evening to hear a lecture by Mr. George W. Mansfield, of the street railway department of the Thomson-Houston Company, on "Electric Railways." The meeting was called to order by Mr. E. Wilbur Rice, the vice-president of the Club, who introduced the speaker of the evening. Mr. Mansfield has already established a reputation hereabouts for always furnishing something interesting and in language easily understood, and this occasion was no exception to the rule. An interesting discussion arose at the close of his paper, which was joined in freely by many present, and gave testimony of the benefits sure to follow frequent gatherings of this sort.

Hearing on Salem's New Company.—The Salem aldermen, Tuesday evening, gave a hearing to Frank S. Pushaw and others who had petitioned for leave to set poles and wires for the purpose of lighting and power by the Westinghouse system. Hon. W. D. Northend appeared for the petitioners, and H. P. Moulton for remonstrants. Mr. Alexander of Hyde Park appeared as a witness for the proposed new company, and stated that the company did not propose to antagonize the present company, but would mainly cater to lighting dwellings, and would establish a plant costing about $40,000. After some testimony by both sides, the aldermen adjourned, taking the matter under consideration.

Inspecting the Electric Road.—Mr. C. G. Goodrich, vice-president of the Minneapolis Street Railway System, was in town last week, being shown over the various electric lines of the West End road by President Whitney. T. W. S.

Boston, June 24, 1889.

OUR TORONTO LETTER.

TO THE EDITOR OF ELECTRICAL REVIEW:

Electrical Fire Insurance is one of the important elements of security in connection with the investment of capital in the insurance business that will require arranging and re-arranging in Canada. I don't know how good rates are given by the insurance companies in the United States on electric plants as compared with rates on similar risks in other lines of industry, but I do know that that in Canada the rates are more than double what they ought to be, and I think at present that most of the electric light companies of Canada are carrying their own risk. There is no valid reason that I can see for the exorbitant rates; it may be that none of our insurance men have given any attention to electrical matters, and confound electricity with the lightning that burns up so many barns over the country.

The Canadian Electric Company of Amherst, in Nova Scotia, have purchased an outfit of fine tools from the London Machine Tool Company, and have gone into the manufacture of incandescent dynamos, telephones, call bells and electrical appliances. They are now busy getting up an exhibit for the St. John summer carnival.

The Consumers' Gas Company of Toronto have lately discovered that it is quite to their interest to go into incandescent electric lighting. A good number of the citizens and the majority of the aldermen are not quite satisfied, however, of the benevolent intentions of said gas company, and so have refused to grant them a franchise. This gas company, like a good many others, has grown rich, as the people think, at their expense, and it is a little doubtful if a franchise will be granted to them lest an extension of their monopoly might result in their becoming possessed of the complete control of all the lighting business of the city. The city fathers have learned from experience that protective clauses in the charters or franchises extended to such corporations, does not always gain for them the ends desired to be accomplished. There are two sides to this question; I think the gas company are fairly entitled to the franchise, and I think further that they have only themselves to blame for not having one. They were strongly urged, about two years ago, when other gas companies were combining gas and electricity to do the same thing, but they then could only get their fingers far enough above the tar to fight the electric light business. They now learn—a little late, perhaps—that gas cannot run everything.

On Dit, that the town of Brockville has decided, after due inspection and consideration to adopt the Slattery Induction system, and put in a 1,200 light plant.

"SYNTAX."

Toronto, Ont., June 24, 1889.

The Louisville *Courier Journal* says: Electricity may take away the street-car mule's job, but it cannot rob him of his fame.

The Consolidated Electric Light Company, of New York, has just declared a quarterly dividend of one per cent. payable through the treasurer, Mr. George H. Lewars, on July first.

The Bloomington City Council last week accepted the new electric light plant installed by the Fort Wayne Jenney Electric Light Company. There are 219 arc lamps, and the cost of the plant to the city was $78,000.

According to a Paris paper Edison has combined the phonograph with the clock in a most ingenious manner. Instead of striking the hour the clock calls out, in well modulated tones: "Dinner time," "One o'clock," "Two o'clock," etc. Workmen will be particularly pleased with a clock that tells them audibly that it is time to quit.

Mr. R. M. Field and Mr. B. F. Stevens, directors of the Phonograph Doll Company, returned to Boston, Tuesday, from New York, having, it is reported, successfully completed all negotiations between Mr. Edison and the company insuring his hearty co-operation in its affairs. Mr. Edison it is stated will begin at once manufacturing dolls for both this country and Europe, and expects to deliver 1,000 dolls a day for each country, beginning about August 1.

FROM FLOOD-STRICKEN WILLIAMSPORT.

The Effect on the Local Telephone Exchange.—The flood on the west branch of the Susquehanna was the highest by six feet of any freshet since the settlement of the valley by the whites about 1760, being over 33 feet above low water mark. The water rose rapidly from 12 to 30 feet at the rate of two feet per hour at Williamsport, Pa. Some 250 instruments of the Central Pennsylvania Telephone and Supply Company were submerged in the Williamsport Exchange alone, and not less than 350 of the 525 subscribers were without service for several days. Many cannot be served even at this date.

Destruction Everywhere.—Many miles of pole line were destroyed; all wires crossing the river and creeks at all points were swept away. There was nine feet of water in front of the Exchange building at Third and Pine streets. At Lock Haven some 40 of the 60 subscribers' instruments were under water. Here they received a deluge of mud and water. At Milton many miles of pole and wire were carried off, and quite a number of instruments were under water. The lines along the Juniata Valley suffered to a proportionate extent, and much time will be required to replace them and furnish all with service again.

Improvements in Rebuilding.—We learn it is the intention of the company, where ever practicable to rebuild the lines that suffered so severely and that have been interrupted before on similar occasions, and also to erect new and improved lines away from the river and other submerged districts to avoid future annoyances of this character.

How the Edison Company Suffered.—The station of the Edison Illuminating Company, Williamsport, although located on the highest point in the city proper was submerged, some three or three and a half feet in the engine and dynamo room. The station shut down on Saturday morning and new dynamos were shipped as soon as they could be transported by the railroad company. The station started again after being shut down for 10 days. Its rival, the Gas Company suffered to almost as great an extent, all of their mains and meters were filled with water, so that consumers of illuminants were dependent upon the Standard Oil Company for their supply and even that was limited for a day or two. The inconvenience may prove a blessing in the end to the companies as well as consumers. They hailed the return of the incandescent light with a feeling of appreciation that can only be experienced after being deprived of a convenience for a short time. "ELECTRIC."

Williamsport, Pa., June 24, 1889.

A Magnetized Watch Loses Its Owner Champagne for a Party.

"It's just 3 o'clock."

"It's twenty minutes after 4"

"Bet you wine for the party I'm right," said the first speaker, emphasizing his remark by snapping down the heavy gold lid of his watch.

"Done" said the other.

Then the two gentlemen started for the City Hall clock, where it was found that the one who had laid the wager was nearly an hour and a half behind time. Indeed his watch had stopped.

An *Evening World* reporter, who chanced to be present, never saw such an expression of surprise as that which was on the loser's face. It appeared that he had been visiting an electric light plant and the steel in his watch had become magnetized.

As the subject of electric motors for cars is interesting just now, inquiries were made of some electricians as to the effects of the current on the passengers.

"It is a question that is very interesting." Electrician Hyals said: "There will be a great deal of electricity generated, and all the iron used in the car's structure will undoubtedly become magnetic, also the rails over which the cars roll are liable to be magnetized through induction. Now, what will be the effect remains to be proven. Of course, the magnets will grow stronger and stronger."

"Would a man's watch be spoiled by his riding in an electric car?" asked the reporter.

"It might. Indeed it is quite likely. Twould be something of a joke, however, if a fellow should ruin a hundred-dollar watch for a five-cent ride."

"I don't think there's any doubt about the current affecting watches," said Jeweller Edwin A. Turall. "I've just had a pretty stiff controversy on that subject myself. It's a well-known fact that electricity magnetizes iron, and there's no getting around it."—*N. Y. Evening World.*

Telephonic News

⁂ The telephone service in Macon, Ga., is on the increase

⁂ The long distance telephone is expected to be in working order at Newport, R. I., very soon.

⁂ The new multiple switchboard for the Telephone Exchange, at Newport, R. I., has arrived and will be placed in position immediately.

⁂ The recent thunder storm was the worst the Bell Company has ever experienced in St. Louis, and did much damage to the local telephone exchange.

⁂ The directors of Erie Telegraph and Telephone Company have organized by the unanimous election of Levi Sprague, president; Chas. J. Glidden, secretary and treasurer.

⁂ "Cape Cod," in the Boston *Post*, says that the Erie Telephone's average net earnings per subscriber for year ending March 31, 1889, were $21.50, compared with $38.19 five years ago.

⁂ The Fairmont, Neb., telephone exchange is a thing of the past. Manager Drake, of Omaha, has given orders for the taking out of all 'phones remaining in use. He says the line to Crete will be completed July 1.

⁂ The many warm friends of Mr. H. L. Storke, will be pleased to learn that he is now recovering rapidly from his severe illness, and in a comparatively short time will undoubtedly be among his telephone friends here again.

⁂ The new telephone line connecting West Buxton, Me., with Buxton Centre Bar Mills and Salmon Falls, is now in working order, and it is expected that the line will be extended to Saco, thereby giving connection with the lines of the Bell Company.

⁂ The linemen of the Hudson River Telephone Company are now engaged in stringing the wires for the extension of the lines of the company to Pine Bush, Ulsterville, and Walker Valley, for which the poles were erected some time since.

⁂ The Iowa Union Telephone Company will soon enter upon the work of rebuilding its exchange at Sioux City. The company is building no additions to its toll line system this summer, but it is doing a good deal of work in reconstructing its exchanges, especially those in the better class of towns.

⁂ The secretary of the National Telephone Exchange Association is now preparing the blanks for the annual statistical reports. These will be mailed in a few days, and it is hoped that the members will fill them up and return promptly. Several new features will be noticed this year.

⁂ It has been decided in France that you can insult a man all you please over the telephone. A man of well known Boulangist ideas called up M. Carnot and anonymously addressed insulting language to him. The police succeeded in ascertaining the owner of the voice, but the court found that he had not committed a misdemeanor.

⁂ Sheriff Melick, of Lincoln, Neb., has the following to say concerning the telephone service in that city, according to the *Daily Journal*: "I hope they won't attempt to pound the telephone company of the city for incompetency, for I consider the service very good. I called up Omaha the other evening and had a man arrested in just four minutes from the time I rung my 'phone. I find the service equally as good as that generally."

⁂ The New York Telegraph Club now numbers 175 members. They moved into their new club rooms, corner of Fulton and Church streets, Tuesday night.

⁂ The United States Circuit Court at Boston was called upon, the 1st instant, to consider another point in the bill in equity to cancel the Bell telephone patent on the ground of prior invention by Reis, of Germany, by Gray, by Drawbaugh and others, also on the ground of fraud by Bell in the patent office. The Bell Company originally demurred on the ground of no authority by the United States to bring suit. The Supreme Court overruled this demurrer and ordered the company to answer. They answered and filed a plea. The United States filed replication. Now the United States asks that an examiner be appointed to take the proofs, and the Bell Company asks the Court to restrict proofs to the fraud issue, on the ground that many of the other grounds for the repeal of the patent set up in the bill are before the Circuit Court in other cases.

A Telephone Story.

A St. Louis man relates the following in an exchange: "The positions in which modern inventions place men at times are ludicrous. Some time since I ordered a telephone put into my residence. In a few days the machine was in working order. My wife is a very delicate, nervous woman, and has her mind so enthralled with Damon and Pythias and other Greek lore and the drama in general that she knows nothing of business, nor can she comprehend the peculiarities of modern science. About ten minutes after I had got through instructing my wife how to secure the benefits of the new institution and had left the house the bell rang. Mrs. H. grew somewhat excited, but she managed to catch the enigma: 'Send me a ham and two dozen young onions to 1728—— street.' She noted it down, said she guessed it was all right, and had just hung up the machine for repose, when she was recalled to listen to a request for eight pounds of vermicelli and a bushel of potatoes for 3908 —— avenue. Then some one called her up and asked that three hens, a sack of oats and a jug of molasses be sent to him. She had just retired when some one called her up and asked: 'Have you any fresh mackerel?' She seldom indulges in slang, but she had got plumb full of wonder and vexation, and asked in reply: 'What do you take us for—a whaling ship?' Some innocent capped the climax by ringing up and asking her: 'What is the price of clothespins by the gross, in Chicago?' Then she hunted the cook and sent her post haste down town to inquire what in the world I had introduced into our home. She sent word that people were ringing her up and asking all sorts of questions about things she had never thought of except when she sat down to eat them. But I had gone out collecting, the cook couldn't find me, and I didn't get home until everybody was asleep. I noticed that the furniture of the house was topsy-turvey, and was just standing over my wife's couch contemplating her beauty in repose and wondering whether to disturb her and inquire whether my effort to contribute to her comfort by telephone had made the day pleasing, when she softly murmured in her dreams: 'No, we are out of cabbage,' and awakened. Just at that moment the machine rang, and I responded, to receive an inquiry as to when the first owl car passed my store. There was consternation in my household that night, and the persistent telephone roused me early next morning with an application for a dozen eggs and two loaves of bread. I threw the trumpet down and turned to dress, only to be continually interrupted with constant ringing, and I let the affair ring. At the breakfast table my wife began to relate her struggles of the previous day, when my glance fell on an advertisement of a firm which I will call 'Green & Packer, grocers.' The 'ad.' instructed customers to order by telephone, and quoted my number. That was the secret of the disturbances."

The Alexandra Palace Telpher Line.

The new telpher line at the Alexandra Palace promises to be one of the electrical triumphs of the year, says our esteemed contemporary the London *Electrical Engineer*. Not only will the trains run at two-minute intervals, carrying some 1,000 passengers an hour (the contract stipulates a minimum of 750), but beyond this the gradient is an extraordinarily steep one, especially for a railway running without cogged rails, being not less than one in eleven, considerably steeper than Highgate-hill. The line, which runs from Wood Green Station to the Palace, is nearly half a mile in length—650 yards is the exact length—with a curved terminus at the end to allow the trains to return without detaching the locomotives. The line is a rigid one, consisting of two rails, the up and down lines, carried about 25ft. above the ground, on rows of stout double posts strongly bolted and braced together. These post carry transverse pieces at the top, furnished with iron plates, to which the rails are bolted. The rails are heavy ordinary rails with heads or rolling surface of circular section. The train is to consist of five carriages, and each of these to hold five persons, slung like a long garden seat, with its back to the posts, boxed in somewhat like a cab for five would be, and properly guarded at its ends and in front. The locomotive weighs, with the driver, about 21cwt. The driver sits on top as he would on a tramcar, and controls the switches and the automatic brake; the passengers, of course, will hang down below the line, but still, at some distance above the ground, carried along amongst the tree-tops. The locomotive is capable of exerting 15 h. p., and draws the weight of five tons at six miles an hour. The difficulty chiefly to be encountered was that of obtaining sufficient frictional contact for the steep gradient. The ordinary rolling friction of locomotives can be taken as about 350lb. per ton. This when the locomotive only weighs a little over one ton, would not be enough, and the system of wedge contact has been employed, as equally effective and not so expensive as the ratchet gearing often employed for steep railways. In this system, the circular head of the rail fits fairly tightly into the grooves of the driving wheel, which are tapered at an angle of 60 deg. This is found to give a grip of 1,000lb. per ton weight of the locomotive. The Alexandra Palace is taking on a new lease of activity under the organizing management of Mr. Lee Bapty, of Manchester and Glasgow exhibition fame, and the ærial telpher line, the first electric overhead passenger railway in England, will no doubt add greatly to its success, and secure to the telpher company a large share of public notice. The enterprise is being carried out for the Mines and General Telpher Company of 15 Great George street, the work is being done by the United Electrical Engineering Company, who are the contactors to the Telpher Company. It is hoped that the line will be ready to open on Whit Monday, in which case the whole work will be carried out within five weeks. This could only have been done by reason of the complete organization of manufacture of the different parts by the United Company and the companies working in conjunction with them. The building of the telpher locomotives, the dynamo, and the engines has been carried out by Statter & Co., at West Drayton, the switches, fittings, and small gear at the United Company's Joblochkoff works on the Albert embankment, and the boiler being the only machinery having to be obtained outside. The present contract for the line is for three years, and the prices for passengers are to be 2d. for the up journey and 1d. for the down.

⁂ Some time ago the Police Committee, of Montreal, decided to accept an offer from the Bell Telephone Company to erect four police alarm boxes, connected with the central and other stations, free of charge. These boxes are now going up, including Victoria square and the corner of St. Lawrence and Craig streets. Should the experiment prove of value the committee will adopt the system, and place boxes in all parts of the city.

Pilfering Telegrams.

Our esteemed contemporary the London *Electrician* gives the following interesting account of a recent attempt at telegraphic robbing in Spain:

An ingenious and determined attempt to intercept the signals passing along the Marseilles cable of the Direct Spanish Company, was recently discovered in the course of some repairs to the underground lines in the streets of Barcelona. The superintendent found that at one spot the ground had been undermined and the four cables cut, the conductors on both sides being connected to insulated wires, which were taken to the wall of the house opposite. Outside this house the leads from each cable were connected together by a binding screw, so that communication between Marseilles and Barcelona was not interrupted. A careful inquiry was at once instituted by the authorities, and it was speedily discovered that the wires had been, at a period which can be traced, led into the cellar of the house opposite the mine, the hole in the wall having since been carefully bricked and plastered up. Fortunately the Direct Spanish Telegraph Company has, in consequence of certain occurrences which took place at an earlier period, adopted a system of working which makes it impossible to read the intercepted signals. As an instance of the ingenuity with which the attempt was made it may be mentioned that, instead of merely binding the wires forming the sheathing of the cables with small wire, clasps with screws to tighten them had been provided, which kept the outer wires in place, after the cables had been cut through. The Spanish Government Telegraph Administration have taken the matter in hand, and every effort is being made by the authorities to secure the culprits. It is not necessary to go very far to seek the reason of this nefarious scheme. The Marseilles cable carries the important Bourse telegrams between Paris and Barcelona, and early information during the recent speculation fever was well worth the risk of detection. As it happened, however, owing to the precautions alluded to, the design must have been entirely frustrated.

The Telephone.

[*From the San Francisco Chronicle.*]

He had never seen a telephone, and his friend was showing him how it worked. It was in his office. He called up his house, and the wife came to the telephone. "My dear, Mr. Jones is here, and I have asked him to come up to dinner."

Then he turned to Mr. Jones and said: "Put your ear to that and you'll hear her answer."

He did, and this was the answer:

"Now, John, I told you I would never have that disagreeable wretch in my house again."

"What was that?" spoke out Mr. Jones, Women are quick. A man would have simply backed away from the telephone and said no more. She took in the situation in a second when she heard the strange voice, and quick as a flash came back the sweetest kind of a voice:

"Why, Mr. Jones, how do you do? I thought my husband meant another Mr. Jones. Do come up to dinner. I shall be so glad to see you."

⁂ Electric cars in Louisville, Ky., were started, Monday, and were thronged all day. Curious crowds lined the sidewalks to see the cars go without the aid of Kentucky mules.

⁂ A number of telephone subscribers in Kansas City, Mo., ordered their instruments taken out on account of increased rates. Superintendent Smith of the telephone company stated that the first rate for residence subscribers within the three-quarters mile limit was $48. It was then changed to $72, but the rate to old subscribers who had not removed was still left at $48 "In order to equalize matters," said Mr. Smith, "we have now fixed the rate at $60. This is a reduction to some and an increase to others, and will not add a dollar to the company's revenue."

A New Fire Alarm System.

The accompanying cuts illustrate a new fire alarm system lately perfected by the Viaduct Manufacturing Company, of Baltimore, Md., on the magneto principle. The great need in this particular line of enterprise for a long time past has been felt to be the operation of fire alarms upon this principle, in order to overcome the time, labor and expense incident to the use of batteries.

This company have been experimenting for some months past to produce a system that would be perfect in every respect, and their efforts have at length, after many changes and alterations, met with success, and they are now prepared to furnish all the necessary information required and to fill orders without delay.

It is specially adapted for use in small towns of from 1,000 to 2,000 inhabitants, and in factories, school-houses, or other large buildings where it is desirable to establish quick and direct communication with a fire alarm department, engine house, etc. The expense of maintenance is little or nothing, as no battery is required to be kept in order, except a small open circuit one to operate an alarm gong. By reference to cut No. 1 it will be seen that the apparatus for the engine house consists of a magneto signal bell, an annunciator drop, vibrating bell, and a battery box, to contain two cells of battery. When an alarm is sent in from the street box, shown in cut No. 2, it causes the annunciator drop to fall into a specially devised circuit closer, which closed a local wire on the vibrating bell, causing it to give a continuous alarm until the drop is replaced in its normal position by the attendant.

He is then required to answer the alarm by signaling back on the magneto bell. This operates the magneto extension bell in the street box, which signifies that the alarm has been received.

The alarm boxes can be placed upon poles and buildings, or in any other convenient position on the streets. As many boxes as may be desired can be placed on one circuit, provided it runs in a particular direction from the engine house.

In addition to the magneto extension bell, the street box contains an improved lightning arrester to protect the instruments and a magneto generator. The simple act of opening the door automatically actuates the generator, thus sending the alarm to the engine house. A very slight movement of the door is sufficient for the purpose; consequently, no experience is required to operate it.

When it is not desired to have anyone in constant attendance at the engine house a tower bell can be arranged to give a general alarm automatically.

The simplicity, efficiency and cheapness of the system will commend it to the citizens of all small towns.

Subway Matters in Omaha.

A petition signed by the Union Pacific Railway, Western Union Telegraph Company, Omaha Street Railway, Omaha Illuminating Company, Nebraska Telephone Company, Postal Telegraph Company, American District Telegraph Company, and the Thomson-Houston Electric Light Company, has been presented to the Omaha City Council asking that they consider the feasibility of the City of Omaha putting in a general conduit system of approved character, and leaving the right of way to the various companies using electric wires in this city, at a reasonable price upon the investment. The petition was referred to the committee on gas and electric light. The Omaha Subway Company ask that they instead of the city should have the privilege of putting in the subway.

.... The regular semi-monthly meeting of The Cincinnati Division Order of Railway Telegraphers, was held last week. Besides the usual routine business the evening was devoted to the election of officers for the ensuing fiscal year. Statistics show a healthy condition of affairs during the year just ended, which will compare very favorably with its predecessors.

The Canadian Pacific vs. Western Union Co's Suit.

In the Supreme Court at Ottawa, Ont., Friday, the judges dismissed, with costs, the appeal in the case of the Canadian Pacific Railway and the Western Union Telegraph Company. This was an appeal from the judgment gained by the Western Union Telegraph Company, in suit against the Canadian Pacific Railway and the New Brunswick Railway Company. The telegraph company made an agreement with the European and North American Railway Company by which they were to have exclusive rights to the roadbed of the railway westward from St. John, N. B., the railway company binding itself to provide and distribute along the roadbed the cedar posts required for telegraph lines, the poles and the entire line, when erected, to be the sole and exclusive property of the telegraph company. The action was brought to restrain the appellants and the St. John and Maine Railway Company from erecting a telegraph line, or in any way interfering with the privileges of the Western Union Telegraph Company.

.... A deed of conveyance from the Baltimore and Ohio Telegraph Company, of Louisiana, Missouri, Baltimore county, Massachusetts, New Jersey, etc., etc., to the Western Union Telegraph Company, of date April 2, 1888, carrying out the sale of the Baltimore and Ohio Telegraph Company property, wherever located, to the Western Union Company, was placed on record in the clerk's office of the Superior Court, at Baltimore, Tuesday. The transfer is the natural sequence of the purchase of the majority of the Baltimore and Ohio Telegraph stock by the Western Union on October 5, 1887. The deed releases the Baltimore and Ohio Telegraph Company of Baltimore county from executing to the Baltimore and Ohio Railroad Company the $6,000,000 in bonds agreed to be executed and delivered to the Baltimore and Ohio Railroad Company as security for the advances made for the construction of the telegraph lines, and this, and the nominal sum of one dollar, is the consideration named in the deed.

.... Deeds from the International and Eastern Telegraph Company to Edward S. Stokes, of New York, and from the latter to Edward C. Platt, of Brooklyn, which have been filed with the County Clerk, convey all interest in a telegraph line running from 10 miles south of Auburn to Auburn, thence by way of Skaneateles and Camillus to Syracuse, thence by way of Baldwinsville and Fulton to Oswego, Watertown and Ogdensburgh. All batteries and other property in offices in Auburn, Syracuse, Baldwinsville, Fulton, Oswego, East Oswego, Mexico, Pulaski, Sandy Creek, Adams, Watertown, Stone Mills, Depauville, Clayton, Alexandria Bay, Hammond, Brice Hill, Morristown and Ogdensburgh are included in the transfer, as is also a telegraph line from Ogdensburgh to Norwood. The consideration is $12,000.

.... Brazil has declared lapsed the privilege for laying a cable from Rio de Janerio to the United States, and will advertise for proposals to construct one immediately.

.... *Le Temps*, of Paris, says that Germany is treating with Belgium in regard to the laying of a cable from Ostend to Portland, Maine, in order to render these countries independent of the English cable companies.

.... The Maine Legislature of 1887 granted a charter for a telegraph cable line to connect the island of Penobscot Bay with the main land. The project has remained

FIG. 1.

partially dormant, but is now being revived and it is thought the cable will be laid the coming summer. The route will be from Northport to Islesboro; from thence to North Haven, striking the north part of North Fox Island, and from thence across the eastern entrance to the thoroughfare at Iron Point, to Vinalhaven, and continue to Carver's Harbor. This line will be of immense advantage to the numerous summer visitors who are taking possession of these beautiful islands of Penobscot Bay.

FIG. 2.—NEW SYSTEM OF FIRE ALARM.

.... The New York *Sun* says: There are men in this city who stand ready to establish telegraphic communication between Hayti and the United States as soon as Gen. Legitime has settled his dispute with Gen. Hyppolite. The business relations between the two countries are sufficient to justify the action which they desire to take. At present despatches from New York to Hayti are telegraphed to Key West, cabled to Havana or Jamaica, and sent from there by steamer to Port-au-Prince, thus requiring several days or still longer for transmission. A short cable line between Hayti and Cuba would be serviceable to several American and West Indian interests.

TELEGRAPHIC

... It is announced that $1,000,000 has been subscribed for the proposed cable between Honolulu and San Francisco, and that the work of laying will be begun within 18 months.

.... The Providence, R. I., committee on police has reported in favor of the adoption of a police signal system, and been granted authority to expend $5,000 in establishing the system after advertising for proposals, the contract to be subject to the approval of the mayor.

.... The Salem (Mass.) board of trade has instructed the committee on transportation to confer with the Western Union Telegraph Company regarding the establishment of a more central office, and to have the same kept open until 10 P. M., week nights and reasonable hours on Sundays.

.... The news of the last race for the Derby was telegraphed to New York in the unprecedented time of two seconds, and within two more seconds Boston and intermediate points, Buffalo and intermediate points, Chicago and St. Louis and intermediate points, and the offices of various newspapers in New York were in possession of the news.

.... J. F. Waterhouse, a capitalist of Honolulu, has arrived at San Francisco. The object of his visit is supposed to be the formation of a company to construct a cable between San Francisco and Honolulu, at an estimated cost of $1,500,000. The Hawaiian government is willing to furnish from $300,000 to $500,000, the remainder to be raised in the United States by stock subscription.

.... By direction of the secretary of war, Lieut. J. C. Walker, of the signal corps, has been detached from Cincinnati, Ohio, and ordered to St. Paul, to assume charge of the Northwestern military telegraph lines, succeeding Lieut. F. M. Ellis in those duties. The telegraph lines are those of the government in Montana, Dakota, Wyoming and Utah. The change is to go into effect Oct. 6th, 1889, and Lieut Walker will relieve Lieut. Ellis only of so much of his duties as pertain to those lines.

... The Western Union Telegraph Company's fiscal year ends June 30th. The annual report due in October will show approximately as follows, says the Boston *News Bureau*, the current quarter being partly estimated:

	1889.	1888.	1887.
Net revenue.....	$6,206,998	$5,070,571	$4,037,281
Interest and sinking fund.....	836,215	530,258	533,065
Balance.....	5,370,783	4,540,313	3,504,216
Dividends	4,309,518	4,043,949	811,864
Surplus.....	1,061,267	496,364	2,692,352

Net, 1886, $3,919,855; net, 1885, $5,700,924; net, 1884, $6,610,435; deficit after 4¼ per cent., 1886, $14,170; surplus after 6¼ per cent., 1885, $166,535; surplus after seven per cent., 1884, $498,915.

.... The third annual meeting of the grand division of the order of Railway Telegraphers will be held at Cleveland, O., this week. The session will last about a week, delegates arriving on Monday or before. In addition to the executive meetings an open meeting will be held in Music hall on Wednesday evening, for which a programme has been prepared embracing music, address of welcome by Mayor Gardner, address by Judge George B. Solders, address of welcome to members by P. W. McAllister, P. G. C. T., and closing address by A. D. Thurston, G.C. T. T. C. Eddy will be master of ceremonies. This order was organized in 1886, after the disintergration of the Telegraphers' Brotherhood following the great strike. Its principles embrace opposition to strikes, harmony with employers, and raising the standard of the avocation by limiting those instructed in the profession. It has now a membership of 14,000, and they will be represented at this convention by about 300 delegates.

* * Five electric street cars are now in operation in Stillwater, Minn.

* * The street railways of Bloomington, Ill., will be immediately equipped with electric motor cars.

* * The Electric Motor Company, of Dubuque, has contracted with the Electric Light Company for power.

* * At the last regular meeting of the Albany Institute, "Electric Street Cars" was the topic of discussion.

* * The machinery alone for the Missouri Electric Power Company's works at St. Louis cost $40,000, and the building will soon be completed.

* * The air in Cleveland, O., seems to be full of electric railway projects. A new road is reported as adopting electric motive power nearly every day.

* * Barry and Company of New York are the contractors for the new Watervliet Turnpike and Railroad Company's electric road at West Troy, N. Y.

* * The new electric storage car in Hartford, Ct., has been given another trial, and works very satisfactorily; the mechanism has been considerably improved.

* * A syndicate of Philadelphia capitalists have secured an option of all the street railway franchises of the San Diego Electric Rapid Transit Street Car Company.

* * The electric light company, at Hastings, Neb., are making arrangements to furnish motor power to several establishments which are now using steam.

* * The Aurora (Ill.) Street Railway Company are just now considering putting in an electric system. The directors are said to be unanimously in favor of the change.

* * It has been decided to make the Spokane Falls, W. T., electric road double tracked instead of single as first intended. Construction work is in charge of a Boston expert.

* * The Citizens Electric Street Railroad Company, of Buffalo, has applied for a franchise to be permitted to proceed with the building of its line in the First and Thirteenth wards.

* * The Electrical Construction Company, of St. Louis, will soon incorporate with a capital stock of $10,000. The company now has a contract to reconstruct the plant of the St. Charles Car Works.

* * The Woonsocket (Mass.) Street Railway Company has been granted the right to establish, construct and use the overhead single electric system of motive power, in the operation of its cars through the streets.

* * Mr. F. Kysor, of Los Angeles, is on his way East to select a system of propulsion for the Vernon street railway, of Los Angeles. Kansas City, Omaha, Des Moines, Chicago, and all the eastern cities will be visited.

* * The Laredo (Texas) Improvement Company now have on hand between four and five miles of rails and ties for their street railway, and have contracted with the electric light company to furnish the motive power for their cars.

* * President Osgood, of the Seattle electric road, states that the road is a great success, and he believes electric roads will eventually supersede all other street railways. A letter from Harry Cobb, superintendent of the Seattle system, states that in six weeks the road has carried 105,000 fares, and that as many as 90 passengers on one car have been carried up a 12½ per cent. grade with ease.

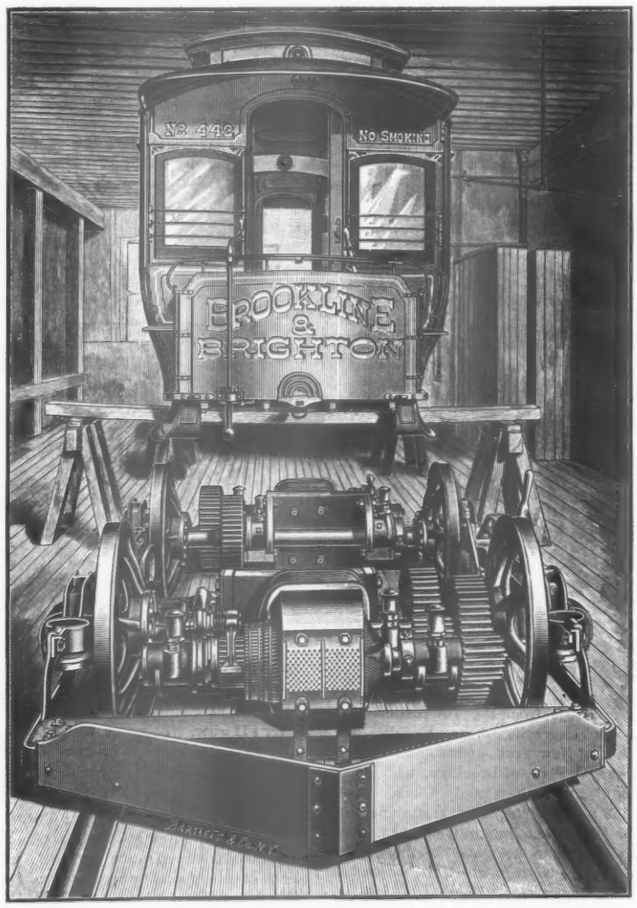
The Bentley-Knight System in Boston.

We illustrate in this week's issue the double motor trucks supplied to the West End Street Railway Company, of Boston, by the Bentley-Knight Electric Railway Company, eight of which trucks are now in use upon the Chestnut Hill, Boylston and Beacon street route of that railway. The cars equipped with these trucks have been in operation for the past five months, making a regular speed of 12 miles an hour, and having attained a maximum speed in regular service of 19 miles per hour. On Sundays and holidays each of these cars tows two others and the speed is not sensibly diminished. Each car is equipped for use with under-contact, elevated conductors. For summer use the West End road is now putting on a number of open cars, each equipped with single 20 h. p. Bentley-Knight machines; and for excursion work and heavy service has just received from the Bentley-Knight Company a 40 h. p. machine, which it is expected will be upon the road within the coming week.

Twelve thousand passengers moved in one day from five tons of coal, and an average cost for fuel of 1¼ cents per car mile is the record made by the Bentley-Knight cars in Boston to date.

OBSERVATORY HILL RAILWAY. DOUBLE MOTOR CAR.

The Rockville, Conn., Gas-Light Company has voted to erect an electric light plant for street lighting and for interior incandescent or arc lighting. The directors have not decided on the system, but have proposals from the prominent electric companies.



BENTLEY-KNIGHT DOUBLE MOTOR TRUCK AND CAR. IN USE ON THE WEST END ROAD.

* * Parties interested in electric railroading propose to build an electric road from Plymouth, Mass., to Wareham, connecting with steamers at the two points, forming a shorter line between Boston and New York and avoiding the route around the Cape. A survey will be made next week.

* * At the annual election of the Rochester, N. Y., Electric Railroad, the following directors were chosen: Asa T. Soule, Wilson Soule, C. C. Woodworth, C. S. Baker, W. C. Barry, W. D. Ellwanger, J. B. Perkins, S. Stace, E. A. Fisher, W. H. Yerkes, B. P. Smith, E. T. Curtis, J. M. Whitney.

* * The Troy, N. Y., and Lansingburgh Railroad Company whose present lease of the road extending from Cohoes to Waterford expires in August, has secured a new and perpetual lease which will begin when the present lease expires. The right to operate the road by electricity or otherwise, has been secured by the lessee.

* * There is now in contemplation by the interests allied with the Eads Bridge, says the St. Louis *Globe-Democrat*, a plan to construct an electric street railway across the bridge, to operate cars running from the western approach to the bridge through East St Louis, covering the principal streets and having terminals at the National Stock Yards.

* * The Denver *Rebublican* says: "Out at South Denver the people are busy at work raising the necessary funds for the electric motor line which is to be built from Alameda avenue south to Sheridan avenue. Prices in both of these localities are stiffening up, and as soon as the hot months are over there will be great activity in both of these sections."

* * The Pumpelly storage battery seems to have found favor with the North American Phonograph Company, which, it is reported, has just placed an order with the company in Chicago aggregating over a million and a half of dollars. The orders for the battery will necessitate the erection of several factories, one of which will be in Omaha, Neb.

* * The Union Depot Railway and the Mound City Railway Companies, of St. Louis, will hold meetings in August to act upon a proposition to increase their capital stock—the former from $400,000 to $1,200,000, and the latter from $125,000 to $1,000,000—and, as this action on their part would indicate, they are preparing to change the motive power on their respective lines in response to the urgent demands of the public for more rapid transit.

* * The sale is announced to a New York syndicate of the electric railroad, which operates between the Twenty-sixth ward, Brooklyn, N. Y., and Jamaica, along the Jamaica plank road. This is said to be but the beginning of a transaction which has for its intention the completion of a rapid transit system from the ferry to Jamaica, to be brought about by a combination of the elevated and electric roads.

* * The Thomson-Houston Electric Company are now constructing for the Ellsworth Electric Light and Power Company, of Portland, Me., a 15 horse-power motor which is to be placed in the shoe factory and also a generator for running a direct current for the same. The same company are also constructing a motor of six horse-power for the foundry and machine shop of Messrs. J. H. and E. K. Hopkins of that city.

* * A meeting of the operators of the five Jellico coal mines was held at the Galt House, Louisville, Ky., last week, for the purpose of discussing the advisability of putting mining machinery in the various mines. A committee was appointed to visit Hocking Valley and inspect the mining machinery in operation there, including a new plant operated by means of electricity, which is giving very satisfactory results and report to an adjourned meeting.

* * The Belden Machine Company, of New Haven, Ct., intends to increase its capital and manufacturing capacity four or five times in case the electric car which is to be tried in that city within two weeks proves as valuable an invention as it is asserted to be. The company's works are situated at the corner of Congress avenue and Daggett street. The officers are R. A. Belden, president; George H. Scranton, treasurer, and Frank T. Lee, secretary. At present the company manufactures steam power hammers, but will turn its attention to the manufacture of these cars should they prove successful.

The Observatory Hill Passenger Railway.

The illustration shows one of the double motor cars now in use upon the Observatory Hill Passenger Railway of Allegheny City, Pa. This road is one of the oldest electric railways in the country, its cars having been in continuous service since December, 1887. The equipment was furnished by the Bentley-Knight Electric Railway Company and now consists of six double motor cars. The work done has constantly been of the heaviest description, the grade climbed being 295 feet in 4,900 feet, while the steepest pitch is 12½ per cent. rise, and the road is remarkable from the fact that over two-thirds of its entire length of four miles is on curve. For one mile the current is conveyed by means of an underground conduit, the remaining three miles by elevated conductors, and each car carries at all times the necessary connections for both underground and overhead conductors.

—— At a meeting of the Quincy & Boston Street Railway Company, Saturday, the action of the directors in leasing the Quincy Street Railway Company for 99 years was ratified and action taken preparatory to the adoption of electricity as a motive power upon the leased line. The lines of the Q. & B. proper are built expressly for electricity. At a subsequent meeting of the directors it was decided to consider the proposal of the Quincy Electric Light and Power Company furnish power for the motors. Should the company offer terms low enough, the railway company may relinquish for the present its plan for the erection of a power station on its property on Hancock street.

The Carbons Twisted and Broke.

Mr. F. C. Todd, general inspector of the Thomson-Houston street railway installations, brings to our notice an interesting incident demonstrating practically the fundamental law that a closed coil, with current passing through it, always tends to place itself so as to enclose the greatest number of lines of force. In fitting up the T.-H. power station at Nashville, Tenn., some incandescent lamps were suspended from the ceiling by No. 16 Okonite cable, so that they were directly over the generators, within 12 inches of the field cores. When the generators were started up and the current turned into the lamps, the filaments in those directly over the generators, in endeavoring to place themselves in the maximum field, twisted up and broke off. Upon lifting the lamps up a foot higher, they burned all right.

—— Through the kindness of Thomas A. Edison a brilliant and successful lawn fete was given on his grounds in Llewellyn Park Wednesday afternoon and evening, in aid of the Fair Haven Lodging-house of the Women's Christian Temperance Union. When the shades of evening drew in a magical change took place. A cordon of electric arc lights surrounding the entire lawn suddenly flashed into radiance, and hundreds of tiny incandescent bulbs scattered among the branches of the trees and in the shrubbery sparkled and glinted, while fairy lamps on each table made the whole scene a wonderfully effective one.

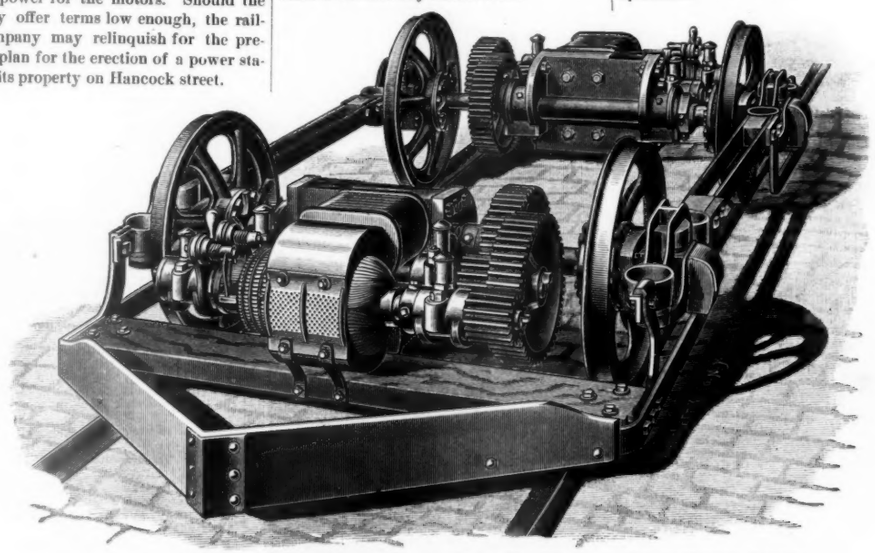
—— The San Diego Gas and Electric Light Company has recently purchased a 65 light Brush dynamo which is now being used on the 12 o'clock arc circuit.

—— The Waterloo, N. Y., Electric Company is putting up new and higher poles in the principal streets. Thirteen tons of thin copper cable have been received for the main line.

—— The growth of the Ashbury Park Electric Light and Power Company's business has been remarkable. Started at a venture four years ago with a total capacity of 45 arc lights, the company is now running 225 arcs, and a 500 light Westinghouse alternating current plant has just been added.

—— The Lyons (N. Y.) Electric Light Company was formally organized by the election of the following officers: President, Samuel Scott; vice-president, James W. Dunwell; secretary, J. W. Van Etten; treasurer, William N. Deady. The company will commence the erection of its new station in a few days. The building is to be two stories high and of brick.

—— The North Shore Electric Light Company, of Revere, Mass., have made great additions to their plant in order to furnish power to the Revere Street Railway Company. An engine of 200 horse-power of the Armington & Sims type, a generator of the same power and a boiler of 150 horse-power, have been put in and will soon be in operation.



Double Motor Truck for the West End Road. Bentley-Knight System.

—— Auburn, N. Y., is increasing its electric street lighting.

—— The board of trustees of the village of Penn Yan, N. Y., has given Messrs. C. and H. Russell permission to erect poles and string wires for electric lighting throughout the village. Only business houses, etc., will use the lights for the present, but in course of time they will be used for street lighting as well.

—— A business meeting was held recently by the board of directors of the Municipal Electric Light Company, of St. Louis, at which a number of contracts received attention. Vice-President Sutter said after the meeting that the company proposed to have their share of the residence lighting, and would be prepared to furnish lights at a rate lower than gas at $1.00.

—— An experiment towards lighting street cars with electricity was made last week on the citizen's cable line in St. Louis. Grip car No. 147 was provided with an arc light, supplied by a storage battery carried on the head end. Though the light went out twice and was finally abandoned about Morgan and Tenth streets, the trial was considered successful. The experiment was under the supervision of Mr. David J. Harris, general manager of the Accumulator, Lighting and Power Company.

—— The irregular lines of electric light poles that are existing in the business portion of San Diego will soon be no more, as the city authorities will soon enforce an ordinance compelling the local companies to take down their poles and to unite in the erection of uniform 45 foot poles.

—— The city council of Denison, Tex., has granted a franchise, by unanimous vote, to the Thomson-Houston Electric Light and Power Company for a period of 30 years. By the provisions of the franchise work is to commence on the plant within a period of 60 days, and to be completed within six months.

—— A special sub-committee of five gentlemen, Messrs. Arthur Kennedy, James Hunter, George Snaman, J. W. Lahugh and Chairman Stayton, of the Allegheny Gas Committee, was appointed at the meeting of the General Committee of the Allegheny, Pa., City Council, Tuesday, to take cognizance of the plan to erect an electric light plant on behalf of the City of Allegheny, pursuant to a resolution passed at the special meeting of Councils on May 31. The sub-committee will receive specifications and plans and report to the General Committee the feasibility of having an electric light plant built, to be purchased eventually by the city.

—— The Board of Trustees of the village of Port Chester, Westchester County, N. Y., have decided to have the streets lighted by electricity. A contract has been made with the Citizens' Gas Company to furnish 40 lamps of 1,200 candle power for $4,000 per year.

—— The Commissioner of City Works, of Brooklyn, has issued to the Edison Electric Light Company a permit to open the carriageway of a portion of Court, Clinton and Remsen streets for the purpose of laying their wires. In the event of the company being compelled to shift their plant, the question of who shall pay the expense of removal will be determined by the Mayor, the president of the company and a third party to be selected by those two.

—— Suit has been brought by the Fort Wayne Electric Light Company against the Evansville Gas and Electric Light Company, which uses the Westinghouse alternating current system, on a patent to M. M. M. Slattery on alternating current system for electric lighting. This is another step in the litigation on the alternating current apparatus, which originally was begun by the Westinghouse Company to sustain the Gaulard & Gibbs patent against the Sun Company and Mr. Slattery, who was at that time in the employ of that company.

ELECTRIC LIGHT NEWS

—— The partially completed dynamo station at Newport, Ky., was blown down during a recent gale.

—— A new 150 light Mather plant has been started in the mills of the L. L. Brown Paper Company, at North Adams, Mass.

—— George B. Edwards, of Charleston, S. C., has about completed the formation of the Florence Electric Light and Power Co.

—— A semi-annual dividend of five per cent. has been declared on the common stock of the West End Railway Company of Boston.

—— The electric light works, of Seattle, W. T., were destroyed by the recent fire. The electric road was uninjured, aside from a few wires being down.

—— What Cheer, Iowa, is jubilant over the prospect of an electric light plant which Mr. E. T. Ramer, of Minneapolis, proposes to establish in the town.

—— Mr. H. H. Mills, of Carthage, N. Y., has entered into a contract for lighting the village of Whitesboro' with at least 15 arc lights for a period of five years.

—— The Mexican International Railroad is preparing to erect a large electric plant for the use of its extensive machine shops and depot, at Eagle Cass, Texas.

——Work on the Glassboro Electric Street Railroad, at Toledo, O., is progressing rapidly, and it is expected to have the road in operation by July 4, if not sooner.

—— The Pittsfield Mass., Illuminating Company are now putting their lights into several dwellings, etc. They have 1,800 lights in town and their business is increasing.

—— Affairs relative to electric lighting are assuming a more definite shape and the probability is that electric illumination is not far off in Dundee, Ill. Incandescent as well as arc lights will be provided.

—— The Essex County Electric Company of Orange, N. J., which has the contract for lighting the city of Orange, is doubling its present plant. The township of West Orange, is negotiating for 35 electric arc lights.

—— The board of gas and electric light commissioners announce that they will give a public hearing on the petition of the North Adams, Mass., Gas Light Company, for authority to engage in furnishing electricity for light and power, in the district court room at North Adams, on Thursday, June 27, at two o'clock P. M.

—— The work of fitting the steamer "Manhattan" of the Inter-Ocean Transportation Line with one of the most complete electric light plants on the lakes has just been completed at Milwaukee, Wis. There is not a particle of space in the large vessel, from stem to stern, that cannot instantly be made as light as day, and she is also provided with signal lights, submarine lights, and a 500 candle-power search light. The latter is supplemented with powerful reflectors, and can produce a glare that will pierce the thickest fog for a considerable distance, so it is said.

—— Superintendent Selden, of the Schuyler Electric Light Company, has been in Alexandria, Va., arranging for the circuits by which the city will be lighted by electricity. The dynamos will be placed at the City Gas Works and the same fires which heat the gas retorts will be employed to generate steam to drive the dynamos. There will be 60 arc lights distributed through the city at the centers of street intersections, cedar poles being placed "catacornered." There will also be some incandescent lights to be rented out by the city committee on light for private use.

Brooklyn Street Railway, Cleveland, Ohio.

The Brooklyn Street Railway, using the Thomson-Houston system, has now been in operation about one month. This line is one of the most complicated and difficult pieces of railway construction which has been done in the country, combining, as it does, curves and grades, the curves numbering 23, and presents problems in electrical engineering, which, however, were all solved satisfactorily to the railway people.

On April 16th the work was commenced, and on May 1st there had been completed one and one-half miles of double track, the engines and boilers set, the generators put in position and the cars in practical operation.

On May 19th the line was opened the entire length, with 10 motor cars, each towing two open cars for one and one-half miles, and on the remainder of the track towing one car. The total length of the road is four and one-quarter miles of double track, and extends from Brooklyn to the Public square, through the business portion of the city. No expense has been spared in the construction of this road, and the track is said to be the finest laid in the country, the Johnson girder rail being used.

The road crosses the Central Viaduct over the Cuyahoga River, which is 2,840 feet long and 102 feet high and has a 237 foot draw.

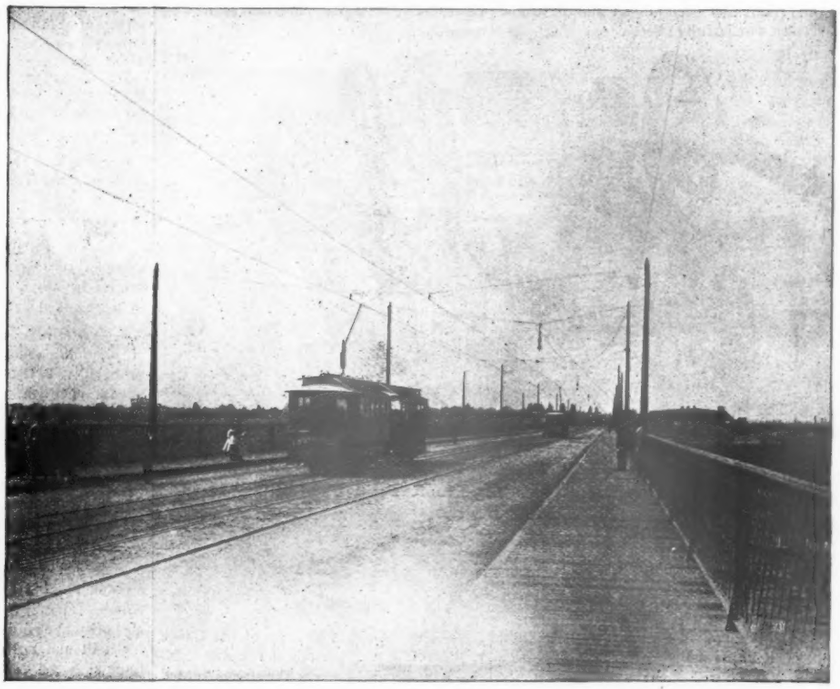
In constructing this line wooden poles were used for three miles and iron poles for one and one-quarter miles, those on the Viaduct being the best which have been used as yet in electric railway work.

The cars, which were built by the John Stephenson Company, are 20 in number, 10 each equipped with two 15 horse-power Thomson-Houston motors and 10 tow cars, painted and finished in the best possible manner.

To each motor car is attached the T. L. Johnson patented brake which enables the motor man to control a three car train with perfect ease and quickness and without any disagreeable jar or jerk.

The brake consists of a shaft that is constantly kept in motion by a sprocket chain from one of the axles of the car. On this shaft there is a tight disk and a loose drum, and to the latter is attached a chain. The operating device on the platform consists of a lever by which the tight disk is brought into contact with the loose drum forcing it to rotate, and thus winding up the chain which applies the brake to either one or two cars as desired.

The car and inspection house is provided with pits so that the cars can be cleaned and inspected without causing the loss of a trip. The power house is situated near the track and is equipped with two 150 h. p. boilers, built by the Variety Iron Works, Cleveland, and two 125 h. p. Ball engines. The electrical plant consists of two 80 h. p. Thomson-Houston railway generators and switchboard with necessary appliances. For eight days working with ten motor cars, and each towing one, and sometimes two cars, carrying on an average 10,000 prssengers daily, working one boiler, two engines, and both generators part of the time, the coal consumption has been 500 lbs. of slack coal per hour, at a cost of $1,20 per ton. This line is giving perfect satisfaction to the public, and the railroad people intend to equip the entire line with this system as soon as possible, which of course means that they are perfectly satisfied with what has already been done.

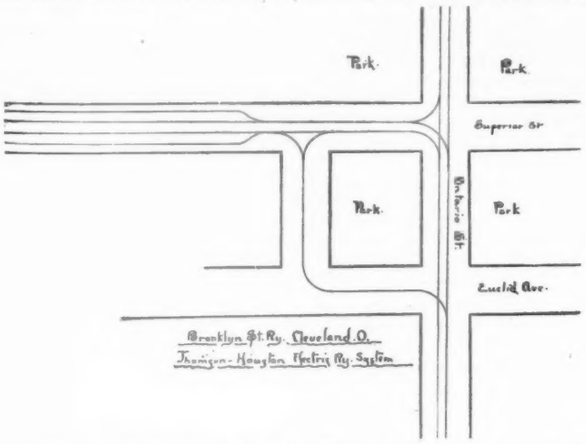


View of the Brooklyn Street Railway, Cleveland, Ohio. Thomson-Houston System.

* * The work of transforming the Second Avenue Railway, Pittsburgh, Pa., into a first class rapid transit line and extending it to Glenwood, is not only in progress but is being prosecuted with all possible energy. The road will be a double track electric line, extending all the way from Glenwood to Duquesne way. It is about settled that a storage battery system will be used instead of an overhead wire system, but what battery has not yet been definitely decided upon.

An Electric Marine Indicator.

An electric theodolite, which indicates with mathematical precision the position of an enemy's ship, whether at anchor or in movement, has been set up at Maddalena. The battery, which defends the island of Caprera, is situated in a valley separated from the sea by a high hill. On this is placed electric machinery communicating with the battery. There is also a very small "panorama" indicating the position of hostile ships, their direction, their distance from the battery, and the point to which the firing should be directed. The gunners do not see the enemy but aim high, the balls passing over the hill. On the other hand, the enemy, having no means of ascertaining the situation of the hidden battery, cannot return the fire.



The Thomson-Houston Electric Company report the following sales: Narragansett Pier, R. I., 30 arc, 1,000 incandescent; Seattle, W. T., 50 arc; Brockport, N. Y., 20 arc; Troy, Ohio, 50 arc; Somerville, Mass., 100 arc; Binghampton, N. Y., 150 arc; Philadelphia, Pa., 100 arc; Lowell, Mass., 50 arc; Boston, Mass., 1,000 alt.; Springfield, Mass., 90 arc; Minneapolis, Minn., 150 arc, 1,200 incandescent; Rochester, N. Y., 50 arc; Chelsea, Mass., 100 arc; Norwich, Conn., 400 incandescent; Goldsboro, N. J., 45 arc, 600 incandescent; Sorrento, Me., 30 arc. And the following isolated plants: Wamsutta Mills, New Bedford, Mass., 400 incandescent; Bennet Manufacturing Company, New Bedford, Mass., 600 incandescent; Whittle & Hanrahan, Providence, R. I., 15 arc; H. Ricker & Sons, Poland Springs, Me., 12 arc; Jewell Milling Company, Brooklyn, N. Y., 300 incandescent; M. W. Hyer, New York, 50 incandescent; Lawrence Line Company, Lawrence, Mass., 50 incandescent; Riverside Mills, Providence, R. I., 25 incandescent.

The Pond Engineering Company has just made a shipment of a 50 horse-power high speed engine to Asheville, N.C., for the electric railway at that place. This means an increase of 50 per cent. in the power plant. The former plant was also put in by this firm. They recently sold a medium sized duplex pump to Kehlor Brothers for their mill at Edwardsville, Ill., and through their branch house at Omaha have secured the contract for an 80 horse-power steam plant for an electric lighting station at McCook, Neb.

The Empire City Electric Company have just brought out an improvement in push buttons, of which they are already manufacturing and selling a large number. It is called the "Duplex Spring" push button, and possesses among other advantages an absolute rubbing contact. This improved spring contact will not corrode or weaken, and the necessity for bending of springs or displacement of screws in applying the push button is entirely obviated.

* * It is reported that a St. Louis syndicate has its eye turned on the Macon, Ga., street railway, with the view of purchasing the same. If the syndicate buys, it is their intention to improve the road in every respect and will operate it by electricity.

* * The Thomson Electric Welding Company has recently contracted with the Trenton Iron Company, of Trenton, N. J., for welding cable rope. It is said that experiments show the electrically united rope gives within 18 per cent. of the nominal strength of the cable.

ELECTRICAL PATENTS

Index of Inventions for which Letters Patents of the United States were Granted in the Week ending June 18, 1889.

405,246 Galvanic battery; William A. Childs, Englewood, N. J.

405,248 Electric switch; Olof Dahl, Brooklyn, assignor to the Cleveland Motor Company, New York, N. Y.

405,249 Electric meter; Olof Dahl, Brooklyn, N. Y.

405,263 Compound wound alternating current dynamos; Hermann Lemp, Lynn, Mass.

405,284 Dynamo electric machine; Frank Thone, Oskaloosa, Iowa.

405,345 Process of electric welding; Charles L. Coffin, Detroit, Mich.

405,365 Electric railway; Alexander L. Lineff, Westminster, assignor of one-half to Edward Hodson Bayley, Eltham, England.

405,382 Telephone switch; Alfred Stromberg, Chicago, Ill., assignor to the Western Electric Company, same place.

405,399 Electric meter; Rudolph Diehl, New York, N. Y., and Philip Diehl, Elizabeth, N. J.

405,420 Attachment for telephones; Hermann Konigslow, Cleveland, O.

405,427 Sheath for regulating light from electric lamps; William H. Melaney, Pittsburgh, Pa., assignor of one-half to R. C. Totten, same place.

405,436 Electro-medical belt; William J. Shelton, Columbia, Tex.

405,440 Electric arc lamp; Elmer A. Sperry, Chicago, Ill.

405,441 Dynamo; Elmer A. Sperry, assignor to the Sperry Electric Company, same place.

405,461 Metallic telephone circuit; Henry L. Burbank, Jersey City, N. J., assignor to the American Bell Telephone Company, Boston, Mass.

405,471 Apparatus for generating electricity; Timothy Gleeson, Brooklyn, N. Y.

405,480 Manufacture of carbon filaments; Theophilus V. Hughes, Holywell, North Wales, and Charles R. Chambers, South Kensington, county of Middlesex, England.

405,507 Dynamo electric machine; William D. Sandwell, Herne Hill, county of Surrey, England.

405,519 Electric appliance for railway switches; Morris Wuerpel, St. Louis, Mo.

405,525 Electrical bell pull; Charles A. Braun, Chicago, Ill.

405,539 Autographic telegraphy; Mark W. Dewey, Syracuse, N. Y., assignor by direct and mesne assignments to the Dewey Corporation, same place.

405,544 Contact device for electric railways; Frank E. Fisher, Detroit, Mich.

405,546 Insulator; Robert P. Frist, Wilmington, Del.

405,556 Electric railway; Rudolph M. Hunter, Philadelphia, Pa.

405,566 Telephone attachment; Otto Konigslow, Cleveland, Ohio.

405,572 Ground detector for electric circuits; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, New York, N. Y.

405,576 Electric wire conduit; John Lynch, Washington D. C.

405,579 Thermostat; John H. Mallon, Francesville, Ind.

405,602 Dynamo electric machine or motor; Conrad L. Rosengvist, Yonkers, N. Y.

405,604 Production of copper by electrolysis; Alberto Rovello, Turin, Italy.

405,609 Galvanic battery; James Serson, Boston, Mass., assignor to to the Potter-Crompton Electric Company, New York, N. Y.

405,626 Slotted conduit for electrical conductors; Charles J. Van Depoele, Chicago, Ill.

405,627 Switch for suspended electric conductors; Charles J. Van Depoele, Lynn, Mass.

405,628 Closed slotted conduit for electric railway; Charles J. Van Depoele, Lynn, Mass.

405,646 Electrical primer; Edmund L. Zalinski, U. S. Army, and Henry J. Smith, Brooklyn, N. Y.

405,647 Delay action primer; Edmund L. Zalinski, U. S. Army, and Henry J. Smith, Brooklyn, N. Y.

405,668 Electric motor or dynamo electric machine; Rudolph M. Hunter, Philadelphia, Pa.

405,677 Telephone combination circuit; Frank A. Pickernell, East Orange, N. J., assignor to the American Telephone and Telegraph Company, New York, N. Y.

405,684 Electric primer; Henry J. Smith, Pompton, N. J., and Edmund L. Zalinski, U. S. Army.

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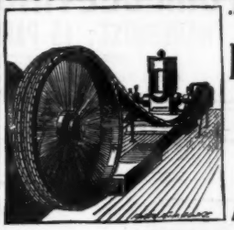

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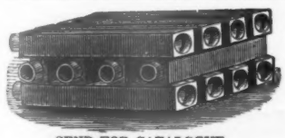

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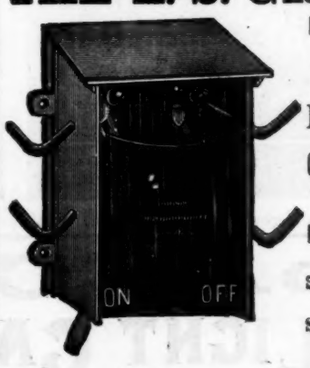

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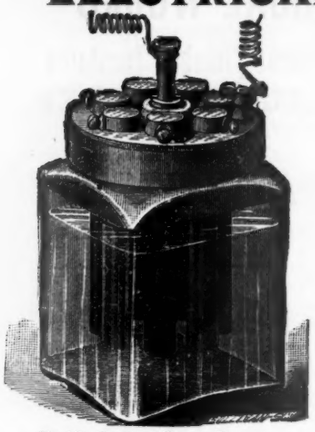

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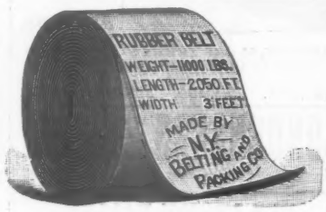

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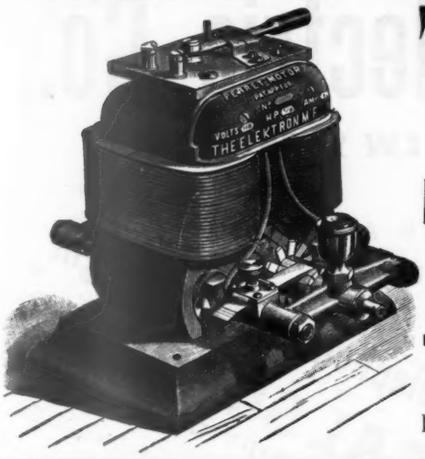

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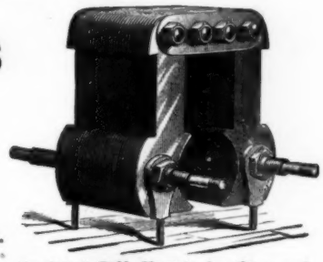

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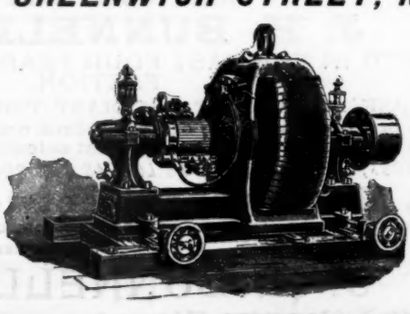

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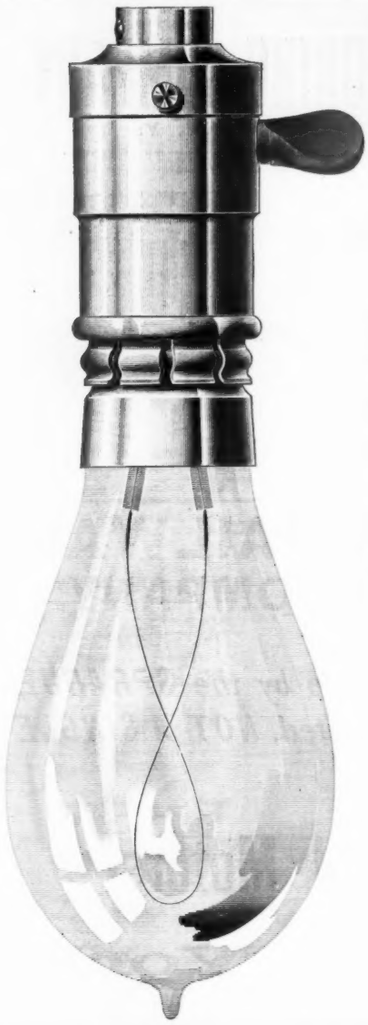

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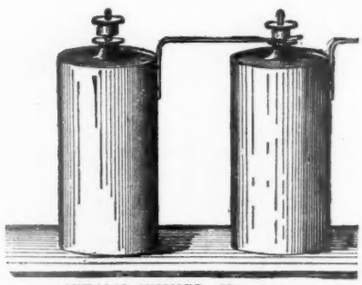

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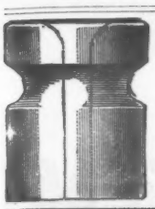

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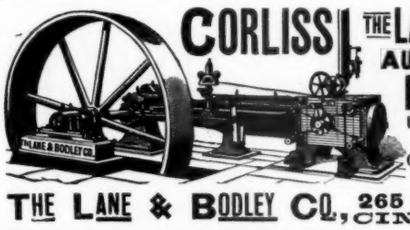

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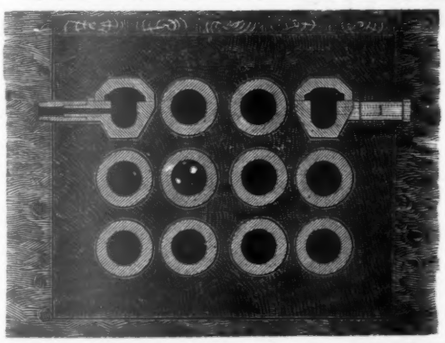

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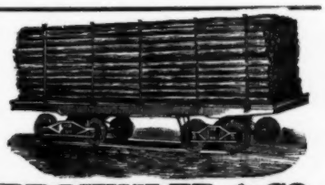

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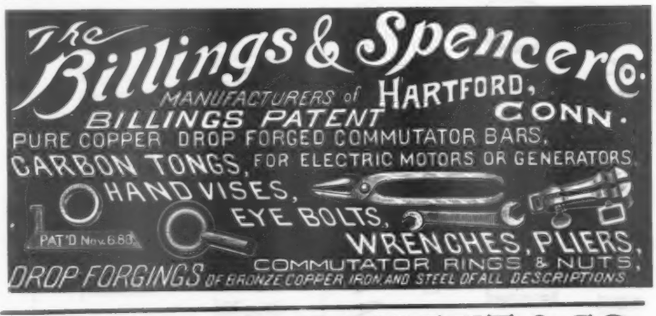
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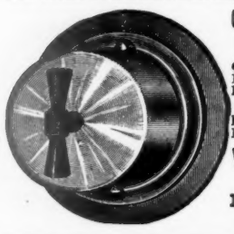

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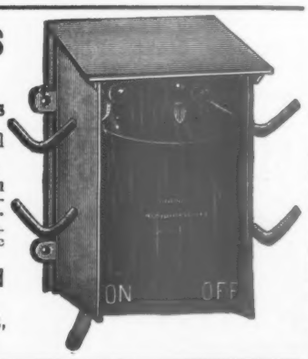

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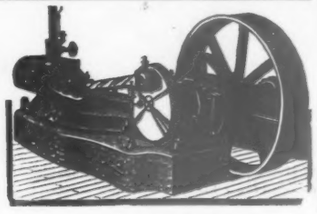

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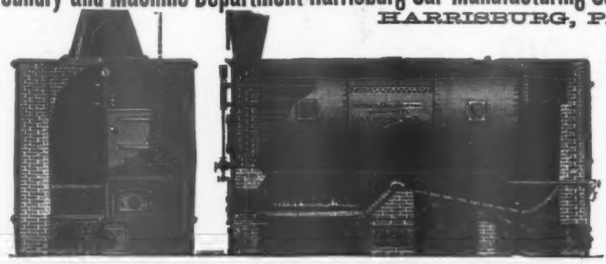

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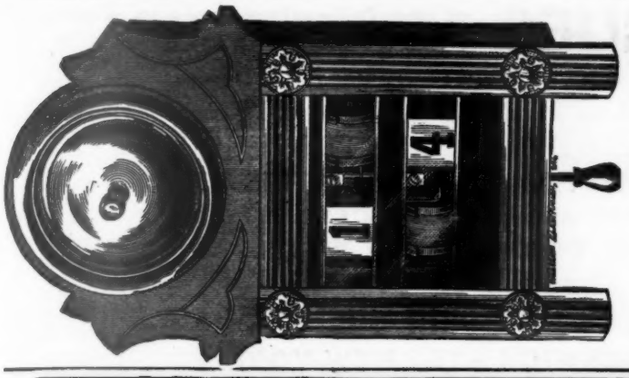

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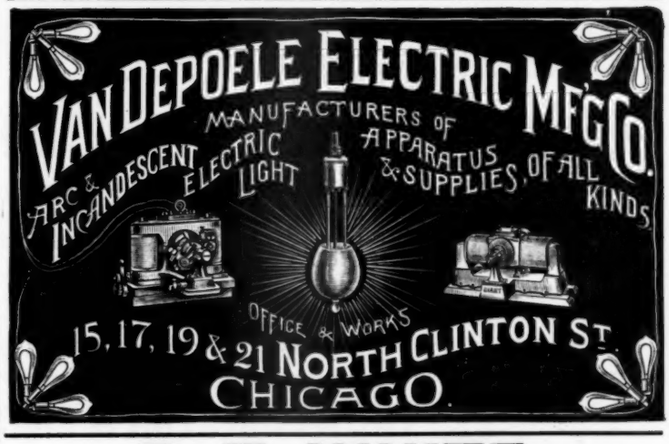
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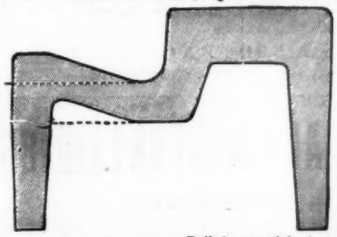

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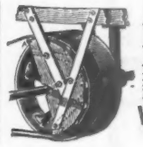

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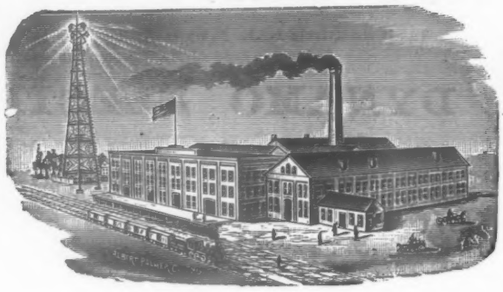

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